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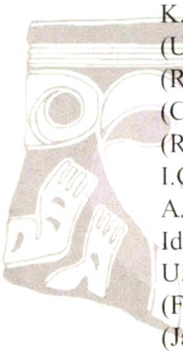

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PALEOENVIRONMENT. THE STONE AGE

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MILLENIAL RECONSTRUCTION OF THE SUMMER TEMPERATURE IN THE POLAR URALS: TREE-RING DATA FROM SIBERAN JUNIPER AND SIBERIAN LARCH*

Introduction

Dendroclimatic investigations in the Polar Urals have quite a long history. A large amount of remains of trees that died many hundreds of years ago can be found here. This allows the extension of tree-ring chronologies beyond the age of the oldest larch and spruce trees, which here reach the age of 400 – 500 years. In particular, there is a large amount of dead-and-down trees within the limits of the sub-golets zone and above the upper treeline in the foothills of the Chernaya Mountain and the Rai-Iz Massif, which are located on the eastern macroslope of the Polar Urals within the Sob River basin. A strong climatic signal is recorded in tree-rings in this region. Using wood samples of currently living and dead Siberian larch trees (*Larix sibirica* Ledeb.) a millennial tree-ring chronology has been obtained for the first time in the subarctic zone (Shiyatov, 1986), and a quantitative reconstruction of mean June – July temperature has been done based on this chronology (Graybill, Shiyatov, 1992; Shiyatov, 1995). Later, a chronology was constructed based on measurements of the maximal density of wood in each annual layer, permitting the reconstruction of mean air temperature for a longer period of the year (from May to September) (Briffa et al., 1995). Now the tree-ring chronology based on the width of annual rings has been extended back to 645 AD, a duration of 1350 years.

It is believed (Hantemirov et al., 1999) that one of the best ways of getting more reliable dendroclimatic reconstructions is to create chronologies by using species of trees and bushes which significantly differ in biological and ecological characteristics from those most often used for these purposes. For this reason, we have conducted a study directed at the search for species of trees and bushes which reach an older age, and whose annual rings accurately reflect the variability of climatic conditions. Special attention was paid to a small evergreen bush – Siberian juniper (*Juniperus sibirica* Burgsd.), reaching a height of 1.0 – 1.5 m and a diameter at the base of the most developed branch of 18 cm. This arctic-alpine species is widespread in the Polar Urals. It grows both under the canopy of light spruce-larch forests and above the upper timberline, in the subbelt of low bush tundra. Siberian juniper reaches an exceptionally old age. The oldest living bush found in this region is 850 years old; 500 – 600 year old specimens are encountered rather often. In other words, the maximum age of Siberian juniper is twice that of large trees (Siberian larch and Siberian spruce) growing there and it should be considered the longest-living woody species in the Urals

Earlier, based on the width of annual rings of the Siberian juniper, we developed a 636-year chronology for the Polar Urals and, proceeding from it, we reconstructed changes in summer temperatures for the last 450 years (Ibid.). In this study it has been demonstrated that the juniper annual rings contain a strong climatic signal reflecting the mean temperature of May, June and July of each year of growth, whereas the chronologies of Siberian larch and Siberian spruce in this region provide information about the mean temperature of June and July only. In addition to this, values of the parameters of relationship and synchronicity with temperature conditions of individual months have revealed differences between chronologies constructed from juniper and other woody species. In particular, larch annual rings generally contain information about July and,

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to a lesser extent, June temperature conditions, while juniper annual rings mostly provide data about the June temperature. This gave us the idea to combine the chronologies developed by larch and juniper and to analyze the climatic signal contained in them. It has been shown that a combined chronology increases the reliability and quality of dendroclimatic reconstruction.

In connection with this, over the last two years we have carried out an intensive search for both living old juniper specimens and remains of long-ago dried bushes and branches in order to extend the chronology into the remote past. As a result, a chronology has been reconstructed back to 641 AD, and in terms of duration it achieved equality with the chronology which was earlier obtained from the Siberian larch.

The task of this research is to examine the issues of construction and further chronological extension of the Siberian juniper tree-ring chronology, to obtain a combined chronology from juniper and larch, to analyze the climatic information contained in this chronology, and finally to reconstruct the climatic conditions over the last 1000 years.

Objects and methods

In order to develop a chronology from Siberian juniper, stem discs were sawn off from the forty-five oldest living bushes growing more or less isolated on the eastern macroslope of the Polar Urals (Chernaya Mountain, Rai-Iz Massif) near the upper limit of the light larch forest distribution (200 – 280 m above sea level). In each bush, the most well-developed branch was selected and a stem disc was detached from its lower portion. In addition, stem samples were taken from thirty-nine dead branches and bushes.

The branches bent and outspread near the ground display highly eccentric annual rings, since the growth of wood layers takes place generally in the direction opposite the ground. Therefore, measurement of annual tree-ring width, especially in case of the oldest specimens, can only be done in one direction, where the radial growth is maximal. Measurements were often made along the curve line, because during their lifetime branches repeatedly change their spatial orientation as well as the direction of maximum growth.

The cross-dating and determination of calendar dates of tree-ring formation was carried out by COFECHA and TSAP computer programs as well as by eye-estimated comparison of the growth curves on the monitor screen and on graphs. The results have demonstrated that the oldest living branch contained 840 rings and the dried branches and bushes died during the period from 900 to 100 years ago (the oldest branch has rings formed from 641 to 1105 AD).

Indices of annual ring width were calculated by the corridor method (Shyatov, 1986). It was found that in junipers each year's growth strongly depends on the growth of the two previous years. In order to make the comparative analysis of a "cleaner" climatic signal recorded in the tree-ring chronologies, the so-called "prewhitening" procedure has been performed, i.e., in all individual chronologies, the influence of the previous years' growth on the growth of each year has been eliminated.

In order to develop a mean chronology from juniper, 84 individual chronologies have been used. The samples used had from 61 up to 840 yearly rings. The duration of the obtained chronology is 1359 years (from 641 to 1999 AD). The interval from 641 to 945 AD is represented by only one or two samples and from 1000 to 1999 AD – by at least nine from each year. In order to carry out a dendroclimatic reconstruction, the last 1000-year interval provided by a sufficient quantity of samples was used. In order to develop a combined juniper-larch chronology, a 997-year-long interval of the chronology based on Siberian larch was used (from 1000 to 1996 AD) (Shiyatov, 1995; Vaganov et al., 1998). The evaluation of the relationship between growth indices and climatic parameters has been done based on the 117-year record of meteorological observation in the city of Salekhard (1883 – 1999), which is situated 50 km east of the research area. In order to expose long-term climatic fluctuations the linear filtration method was used (Mazepa, 1986).

Results and discussion

Reconstructions of the summer temperatures obtained through the use of the mean chronologies based on juniper and larch differ from each other considerably: the correlation coefficient between them over the whole interval under reconstruction is quite low (0.32). The differences are caused by the fact that these chronologies contain various climatic signals. As it was mentioned above, a growth of juniper reacts more to the temperature changes of early summer, while a growth of larch reacts mostly to mid-summer temperature changes. To a certain extent this is supported by instrumental observation data. As a rule, the higher the difference between the mean July and May – June temperatures, the higher the discrepancy during the same year between the two examined reconstructions.

The combined chronology was based on the evaluation of the multiple regression parameters between the growth indices of the mean chronologies of juniper and larch and the mean June – July temperatures. The summer temperature reconstruction obtained by the combined chronology shows higher similarity with instrumental data, if compared with those based on the chronologies developed separately by juniper and larch. The correlation coefficient between actual temperatures and those reconstructed by the combined chronology for June – July

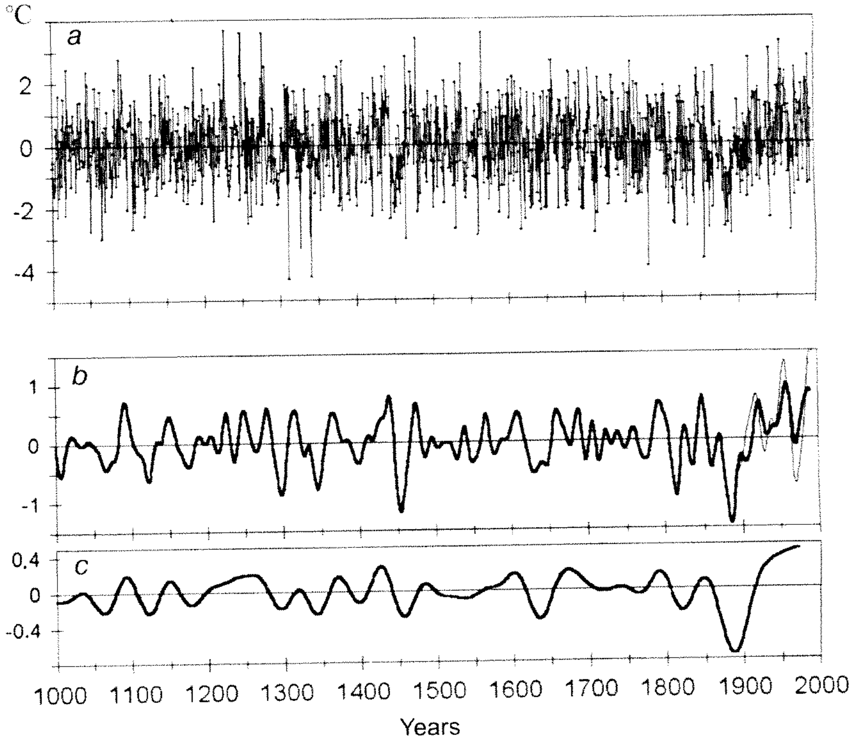

Fig. 1. Dendroclimatic reconstruction of mean June – July air temperature anomalies. *a* – annual data; *b* – intracentennial fluctuations (the thin line shows data obtained through instrumental observations in Salekhard); *c* – centennial fluctuations.

of 1883 – 1996 is 0.73 and the synchronisation coefficient is 76%, whereas these values from juniper and larch chronologies are 0.61 and 71%, 0.60 and 73%, respectively. It is important to note that during the period in question, the relationship between the climate and the ring width indices remains invariably high (correlation coefficient for the period 1883 – 1941 is 0.73 and for the period 1942 – 1996, 0.71). Fig. 1, *b* shows the actual fluctuations of summer temperatures and those reconstructed using the combined chronology smoothed by a 20-year low pass filter. As the figure demonstrates, the curves coincide.

The reconstructed annual fluctuations of the summer temperatures for the last 1000 years are shown on Fig. 1, *a*. Their large range, reaching 8°C, draws attention. Considering the fact that the range of the air temperatures reconstructed by tree-ring chronologies is usually less than that of the actual temperatures, it is possible to that it was actually no less than 10°C. It should be noted that this changeability was different in different periods (Fig. 2); during the warm summer seasons it was higher. Evidence of extremely cold summer seasons presents particular interest, because they have significant impact on the functions of various components in northern ecosystems as well as on economic activities of the population. During the last 1000 years, the coldest summer seasons in the Polar Urals were in 1312 (the deviation from the mean was –4.3°C), 1328 (–3.3°C), 1342 (–4.2°C), 1466 (–3.0°C), 1783 (–4.0°C), and 1855 (–3.8°C). Most often cold summer seasons were observed in the 19th and 14th centuries and most rarely in the 12th, 13th and 15th centuries (see Fig. 1, *a*).

Dendroclimatic method permits revealing not only annual, but also intracentennial (from 2 – 3 to 60 years) and centennial (above 60 years) fluctuations. Intracentennial (*b*) and centennial (*c*) changes of summer temperatures in the Polar Urals are demonstrated in Fig. 1. Although the range of these fluctuations is smaller than that of annual fluctuations (4.3 and 1.5°C respectively), it is evident that natural intracentennial and centennial changes of the summer temperature were characteristic of the whole period of time under study.

While analyzing the intracentennial fluctuations, two exceptionally cold periods should be noted at the end of the 19th and in the middle of the 15th centuries. In addition, cold summer seasons took place at the end of 13th – beginning of the 14th centuries, in the middle of the 14th and at the beginning of the 19th centuries (see Fig. 1, *b*). As a rule, during these periods the lowering of summer temperatures proceeded gradually, with the exception of the middle of the 15th century, when the temperature dropped almost instantly: in 1445 the mean summer temperature was 1.5°C above the mean and in 1446 it was 2.4°C below the mean; after that the summer temperature did not rise above the mean for many years. Among the warm intracentennial periods, the end of the 11th – beginning of the 12th century, the first half of the 15th, the end of the 18th century and two periods within the 20th century (the middle and the end of the century) should be noted.

Among the centennial climatic changes an exceptionally cold period in the second half of the 19th – beginning of the 20th century – the coldest in the last millennium – draws particular attention. This cooling ended with a drastic rise in summer temperatures that continues to the present time. It should be pointed out that warming of the climate during the 20th century in the Polar Urals was most intensive if compared with other sectors of the Siberian Subarctic region (Vaganov et al., 1998). Long and intensive warming also occurred in the 13th century. During this period, forest vegetation reached its highest level in the mountains (Shiyatov, 1995). The 14th century was generally cold.

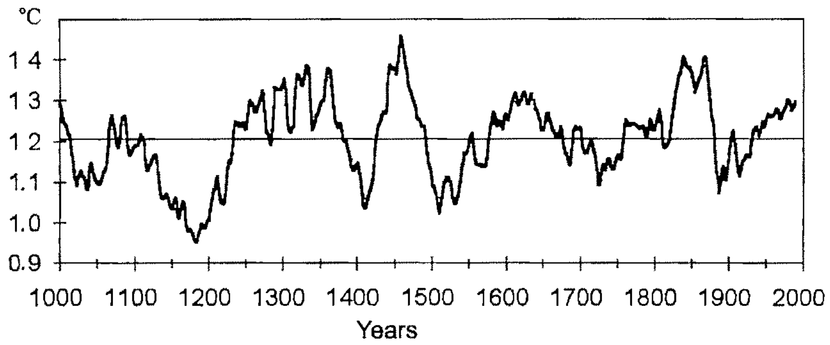

Fig 2 Dynamics of the annual variability of the reconstructed air temperatures, expressed in changes of standard deviation during the 50-year periods.

Conclusion

The millennial reconstruction of summer temperature fluctuations with an annual resolution presents an interest for understanding of natural and anthropogenic variability of the climate and also the exploration history of the region. Such fluctuations influenced certain species of plants and animals as well as the formation of land and water ecosystems. These fluctuations also impact the economic activity of the people living in these extreme climatic conditions. The conclusions and inferences concerning the climate variability which were obtained through the analysis of the annual rings of trees and bushes in the Polar Urals can be extrapolated to a major portion of the northern part of West Siberia, since under the conditions of the Far North homogeneous temperature fields occupy vast territories (to 500 – 800 km in diameter) (Vaganov et al , 1996). In addition, long-term tree-ring chronologies are of a particular importance for absolute dating of historical, archaeological, and ethnographical sites (Shiyatov et al., 2000).

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Itogi i perspektivy ispolzovaniya dendrokhronologicheskogo metoda dlya datirovki arkheologicheskikh, istoricheskikh, i etnographicheskikh pamiatnikov na territorii YNAO. *Nauchny vestnik* (Salekhard). Iss 3: Arkheologiya i etnologiya: 49 – 56

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QUATERNARY MAMMALS OF DONGBEI (NORTHEAST CHINA)

Dongbei is situated in Northeast China. Its level topography and fertile soils are formed by the Sungari (Songhuajiang) and Nonni river valleys in the north, the Sungari and Liaohe valleys in the central part, and the lower Liaohe valley in the south. The Great Dongbei, or Manchurian, Plain abounds in Quaternary sediments. To the west and east, mountains and hills prevail: in the east, the Lesser Khingan and Changbaishan ranges extend as far south as the end of the Liaodong Peninsula; in the west the Great Khingan Range towers at an altitude of 800 – 1000 m above sea level (the highest peak exceeds 1400 m).

According to data from the comprehensive study carried out in the 1950s by Pei Wenzhong, four regions of distribution of Quaternary mammals can be singled out in China (excluding Taiwan, Tibet and Xinjang): northern, southern, Huai (the Huai River basin), and northeastern (Dongbei). The Huai region represents a transitional zone between the northern and the southern regions, while Dongbei is an offshoot of the northern one.

The study of Quaternary mammals of Dongbei began in 1911, when the Russian researcher Pavlova described fossil remains of a bison found on the banks of the Sungari River. In 1925, the Russian scientist E.E. Anert found remains of woolly rhinoceros and mammoth in Fulaerji (near Qiqikar) and in Zhalainor. In 1931, the Chinese geologist Yin Zanxun and the Russian scientist A.V. Ponosov published a report on their inspection of fossils in the layers of Guxiangtun. From 1932 to 1937, the Russian scientist A.S. Lukashkin studied fossils and stratigraphy. From 1937 to 1943, the Japanese specialists Tokunaga Shigeyasu, Naora Nobuo, Endoo Takatsugu, Ishijima Wataru, and Shikama Tokyo investigated mammalian fauna in Guxiangtun. In 1956, the Russian researchers Gordeev and Zhernakov discovered a complete fossilized skeleton of a woolly rhinoceros 1.82 m high and 3.67 m long in Fulaerji, in the layer of lacustrine silt deposits at a depth of 9 m from the diurnal surface. This has been the largest finding of this kind discovered in China. Its geological age corresponds to the Late Pleistocene.

In the territory of the Liaoning Province, Quaternary deposits of a different genesis are widespread. Loose sedimentary deposits of continental facies prevail here; deposits of marine facies are limited to the southern seashore. Liaoning has undergone the influence of global climatic oscillations and new tectonic movements. During the Yanshan period, the hills and mountains on the western and eastern margins of Liaoning were in a state of elevation for a long time, as the valley of the lower reaches of the Liaohe River was being formed in the central region. The area between the two rows of low mountains was eroded by rivers and streams, forming wide terraces of various levels on the riverbanks. Karstic processes formed a large number of caves. Such a landscape created excellent conditions for a wide range of mammals.

The remains of these animals serve as a basis for studying the dynamics of their composition and morphology through time, making possible further investigation of climatic changes and their impacts on living conditions.

In the scientific report *A Review of Quaternary Mammals in the Dongbei Region*, Zhou Mingzhen mentioned small bone remains of such animals as aurochs, wild horse, and others, found in Kangping and Faku (Liaoning Province). Until the early 1970s, it was believed that in three provinces of Dongbei, only three fauna complexes – Guxiangtun, Zhalainor, and Yushu – represented Late Pleistocene fauna. Up to the present, about 200 occurrences of Pleistocene mammal remains, including 30 sites containing faunas of varying age,

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have been discovered in Dongbei (see Figure). In the Liaoning Province, faunas representative of not only the Late Pleistocene, but also the Middle and Early Pleistocene have been recorded. In Linxi, bones of the vole (*Mimomys chinensis*) have been found; faunal remains have also been recorded in the Early Pleistocene layers in Haimao (Dalian city), and in the Middle Pleistocene layers of limestone caves and fissures in Jinniushan, Miaohoushan, Maoershan (Kazuo Prefecture), and Zanshan (Yinkou city).

Early Pleistocene fauna complexes in Haimao

The remains were collected in a stone quarry located north of the Haimao settlement (Ganjingzi region, Dalian city) at approximately 39°9'30" N, 121°38'42" E. The bedrock represents limestone of the Ganjinzi suite of the Xini period; numerous caves and fissures occur in the vicinity. The mammal remains, mainly microfauna, were found in a layer of red clay with a low gravel content. The following animals were identified: hedgehog (*Erinaceus* sp.), mole (*Talpidae* cf. *yanshuella*), Weng white-toothed shrew (*Crocidura wangi*), horseshoe bat (*Rhinolophus pleistocaenicus*), bat (*Myotis* cf. *pequinins)*, Nihewan pika (*Ochotona nihewanica*), marmot (*Marmota complicidens*), zokor (*Prosiphneus* sp.), jerboas (*Allactaga* sp.), and vole (*Microtus minoeconomus)*.

Among the Haimao microfauna, noteworthy is *Prosiphneus* sp This animal, up until now undiscovered in Northeast China, is a relic of the Neogene period. Its remains have been also recorded in Early Pleistocene layers and are often found in Nihewan suites of the North China Cenozoic. The Haimao fauna in the vicinity of Dalian marks the first Early Pleistocene section in this region, whose age is ca 1.6 – 1.2 Ma, corresponding to the Hejiashan fauna in the region of Tangshan (Hebei Province).

Middle Pleistocene faunas

Five occurrences of Middle Pleistocene fauna have been found in the territory of Dongbei (mainly in the Liaoning Province): the Jinniushan, Miaohuashan, Maoershan (Kazo Prefecture), Anping (Liaoyang city) and Zanshan (Yinkou city) faunas. In addition, several loci of bone fragment accumulation have been recorded.

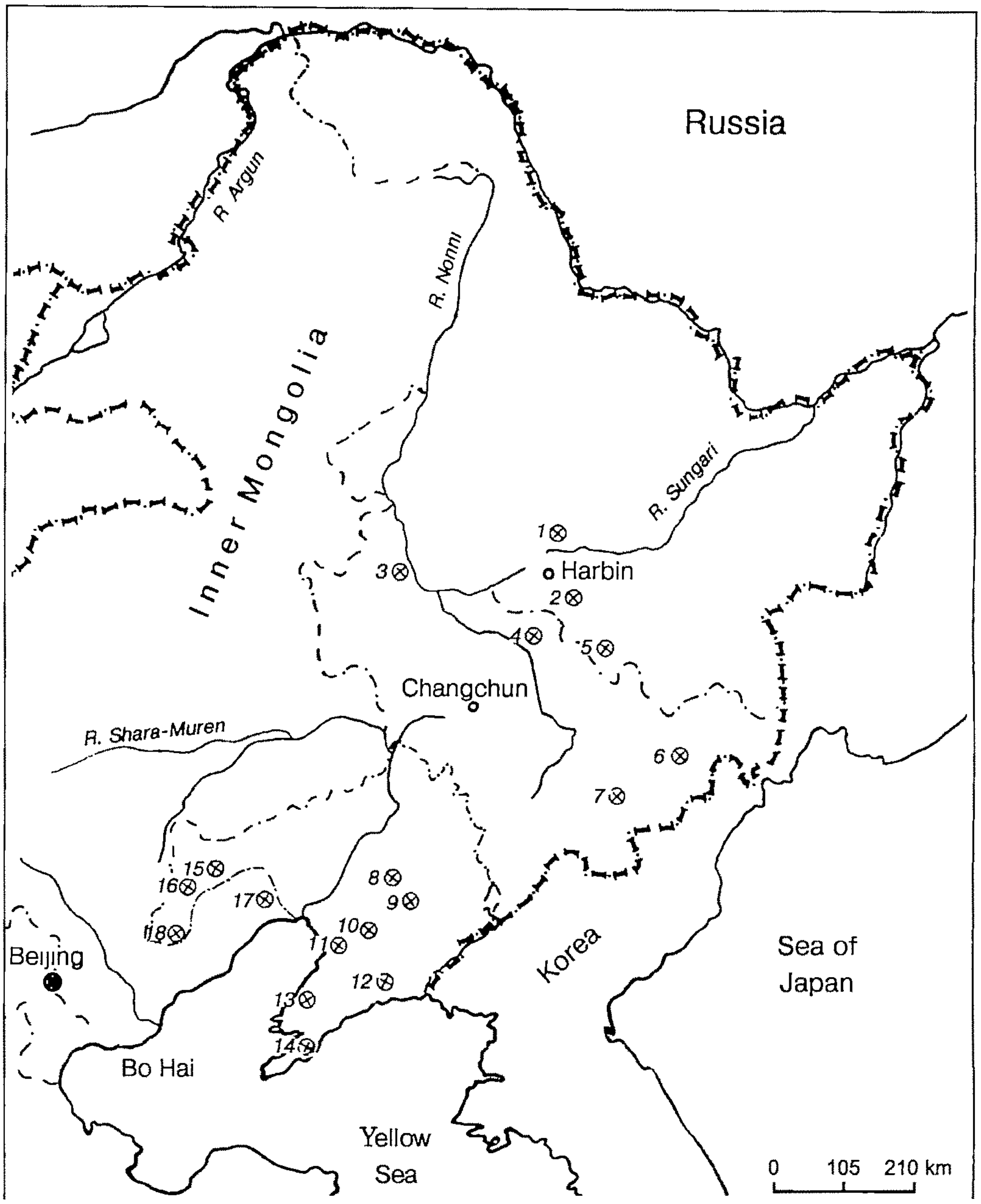
1. ***Jinniushan fauna,*** a microfauna rich in anthropological remains, was found during excavations of the prehistoric site of Xitiancun, southwest of Dashiqiao (Yinkou Region). The site is located in a cave of Early Xini limestone (40°34'40" N, 122°26'38"E). The total depth of cave deposits is 13.5 m. Stratigraphic layers may be divided into two groups with a border in the fourth layer. The upper group contains the Middle Pleistocene layers of brownish-gray and brown-yellow loamy sand and breccia; according to the uranium dates its age is ca 160 – 200 ka BP. The lower group of sediments was composed of firmly cemented cave breccia and sandy clay of brown-red color; according to uranium dates its age is ca 200 – 310 ka BP. Human bones were found in layer 8 (260 ka BP). All the remains found represent Middle Pleistocene species that have often been encountered in northern regions of China, as well as relict species of the Tertiary period. The most important species are. Han hedgehog (*Erinaceus olgae*), Weng hare (*Lepus wongi*), Brandt vole (*Microtus brandtioides*), beavers (*Trogontherium cuiveri* and *Sinocastor* cf. *zelanskyi*), porcupine (*Hystrix lagrelii*), ape (*Macaca robustus*), dog (*Canis variabilis*), Chinese raccoon (*Nyctercutes sinensis*), sabre-toothed tiger (*Homotherium ultima*), cheetah (*Acinonyx* cf *jubatus*), Sanmen horse (*Equus sanmeniensis*), Merk rhinoceros (*Dicerorhinus merki*), and giantantler deer (*Megalocervus pachyosteus*).

In addition to the above mentioned, osteological remains of birds and reptiles have been found. The lower group of Jinniushan layers corresponds mainly to the upper part of the stratigraphic profile at the Zhoukoudian-1 site.

The upper portion of Jinniushan sediments contained fragments of a human skeleton (cranial, vertebral, carpal and ulna bones), lithic implements and much evidence of the use of fire. These are the earliest and the best-preserved fossil human remains in the territory of Dongbei. In the culture-bearing horizon of more than 1 m, over 10 thousand bone fragments (broken for extracting the marrow) were found. Stone implements scattered over the horizon, ash accumulations and numerous human bones form an integrated occupation horizon. This proves that humans inhabited Jinniushan for a long period of time.

2. ***Miaohoushan fauna*** is synchronous with *Homo erectus*. This fauna is associated with the prehistoric cave site formed in Ordovician limestone on the southern slope of Miaohoushan Mountain, east of Shanchengzi (Benxi Prefecture), at 40°14'49" N, 124°7'50" E. At present, it is the northernmost occurrence of Middle Pleistocene faunal remains, as well as the northernmost Lower Paleolithic site found in China. Eight stratigraphic units (numerated downwards) have been identified at the cave. Starting from layer 6 and below, Middle Pleistocene sediments composed of sandy loam of yellowish-brown color with breccia inclusions occur. This portion of the sediments corresponds to the Miaohoushan fauna. Layers 7 and 8, situated above, contain the Shanchengzi fauna.

The Miaohoushan fauna is represented by Sanmen horse, Merk rhinoceros, giantantler deer, buffalo



Map showing the location of the key Pleistocene mammal occurrences in Northeast China
1 – Yanjiagang, *2* – Acheng, *3* – Qian, *4* – Yushu, *5* – Xuetian, *6* – Antu, *7* – Fusong, *8* – Anping, *9* – Miaohoushan, *10* – Xianrendong, *11* – Jinniushan, *12* – Qianyang, *13* – Gulongshan, *14* – Haimao, *15* – Maoershan, *16* – Hezidong, *17* – Juejiadian, *18* – Bajianfang.

(*Babulus* sp.), Lydekker boar (*Sus lydekkeri*), Chinese hyena (*Hyaena sinensis*), dog (*Canis variabilis*), Asiatic cheetah (*Acinonys* sp.), Young panther (*Panthera youngi*), Weng hare (*Lepus wongi*), marmot (*Marmota complicidens*), macaque, sabre-toothed tiger, and beavers (*Sinocastor anderssoni* and *Sinocastor zdanskyi*). These faunal remains were found in the lowermost part of layer 4. According to paleomagnetic data, the age of the lower layers of the cave is not less than 730 thousand years, and that of layers 4 – 6 is 330 – 140 thousand years. Judging by the findings, the fauna mainly corresponded to forest-steppe environments. According to spore-pollen analysis data, the environment was characterized by warm and humid climatic conditions, with deciduous, evergreen and coniferous plants coexisting.

3. ***Maoershan fauna*** is represented by remains found in caves situated in Ordovician limestone in

Dongshanzui, near the Zhangjingyingzi settlement (Xingluzhuang Region, Kazuo Prefecture, Chaoyang District, Liaoning Province). The faunal remains are located in the upper reaches of the Dalinghe River (41°6'58" N, 119°17'49"E). The bones were found in a sandy loam layer of brown or red-brown color. They belonged mainly to zokor (*Myospalax* sp.), Weng hare (*Lepus wongi*), wolf (*Canis* sp.), badger (*Meles* sp.), hyena (*Hyaena* sp.), bear (*Ursus* sp.), Sanmen horse, boar, and giantantler deer. Two species well represented in the sample – Sanmen horse and giantantler deer (*Megalocervus*) – are of special importance for the stratigraphic dating of the sediments. Judging by the structure and proportions, the horse teeth of the upper jaw are somewhat larger than in the specimens whose remains were found at Zhoukoudian (loci 1 and 13). This probably points to the fact that by the late period of the Middle Pleistocene a gradual increase in the size of the Sanmen horse was taking place. The giantantler deer also demonstrates the classic type: the thickness of the outgrowth on the lower part of the frontal bone is well expressed, the cross-section of the lower edge of M3 is almost round, and the thickness of projections is larger than that in the specimens from Jinniushan and Miaohoushan. It may be stated that the bones of the frontal part of the deer skull are the most classic specimens among those preserved up to the present time in the Middle Pleistocene layers in the Dongbei Region.

4. *Zangshan fauna* includes faunal remains found near the Chenjiabao settlement (Baizhaizi Region), 30 km northeast of Dashiqiao city (Yingkou District) at 40°30'01" N, 122°30'35" E. The remains were found on a mountain slope at an altitude of 110 m above sea level in a karstic cave, within sediments of the Shengshuisi group (Liaohe suite of the Xini period). The bones were found in a clay layer of brownish-red color inside the cave. Apart from the faunal remains, a small number of lithic artifacts were found. Representatives of the following orders were identified: Lagomorpha (*Ochotoma* sp.), Rodentia (*Lasiopodoys brandti, Myospalax aspalax, Micromys* cf. *minutus*), Primates (*Macaca robustus*), Carnivora (*Canis variabilis, Nyctereutes* sp., *Ursus arctos. Mustela sibirica, Meles meles, Crocuta ultima*), Perissodactyla (*Equus sanmeniensis, Dicerorhinus*), and Artiodactyla (*Sus* sp., *Cervus A* and *B, Hydropotes* sp., *Capreolus manchuricus, Spirocerus* sp.).

The Zangshan fauna includes representatives of classic Middle Pleistocene species, e.g., Sanmen horse, macaque and dog, as well as species that appeared in the Late Pleistocene. The number of completely extinct species is small. The color of the sediments changes from brown-red at the bottom to light yellow at the top. Thus, in the Zangshan cave, layers representing two sedimentation stages and illustrating the Middle to Late Pleistocene transition were identified. The upper layer contains bone remains of comparatively late species, e.g., the latest striped hyena, brown bear, and spiral-horned antelope. It may be conjectured that the lower portion of stratigraphic profile was formed at the end of the Middle Pleistocene, the upper layer during the Late Pleistocene.

5. *Anping fauna* was recorded on the eastern side of the Tanghe River, near the Anping(zhen) settlement, southeast of Liaoyang city (41°10' N, 123°26' E). Bone remains occurred in sediments filling fissures on the surface of Cambrian-Ordovician limestone. The lower portion of the sediments (layers 3 – 5), brownish-red clay with breccia inclusions, contained numerous faunal remains representing seven orders and twenty-two species, including Han hedgehog (*Erinaceus olgae*), zokor (*Myospalax fontanieri*), macaque, Young panther (*Panthera youngi*), Chinese raccoon dog (*Nycterentes sinensis*), Merk rhinoceros, sika deer (*Cervus nippon*), deer (*Rusa elegans*), musk deer (*Moschus moschiferus* var. *pekinensis*), and boar.

The Anping fauna is characterized by a relatively complete preservation of the fossils. Bones of rhinoceros (*Rhinoceros merki*) are especially well represented, allowing the reconstruction of several skeletons. There are also two skulls of Young panther with well-preserved upper and lower rows of teeth. In addition, remains of water deer were found; they are seldom encountered in the Dongbei region, since this species is characteristic of warm and humid climatic conditions. The share of extinct species in the Anping fauna sample reaches 62.5%. Comparing the composition of sediments with the results of analysis of the whole assortment of fossil species, it is possible to attribute this locality to the Middle Pleistocene (although it lacks such classic species as *Megaloceros, Hyaena hyaena,* and *Equus sanmeniensis*).

Late Pleistocene faunas

Late Pleistocene fauna locations are extremely widespread in Dongbei. According to incomplete data, about 260 faunal specimens have been found in cave and terrigenic sediments, as well as a small number in marine sediments. Among the most important groups of fauna, the following ones are distinguished: Acheng (Heilongjiang Province), Hezidong, Xianrendong, Yushu (Jilin Province), Yanjiagang (Harbin city), Qianyang (Dandong city), Gulongshan (Daliang city), Bajianfang (Lingyuan Prefecture), and Quejiadian (Changtu Prefecture). All of them encompass a period from the early stage of the Late Pleistocene to the end of the Late Pleistocene. The fauna of the Dongbei mammoth complex has been singled out among them.

1. ***Acheng fauna*** was recorded at a site in a karstic cave near the settlement of Jiaojie(zhen), near the city of Achen (Heilongjiang Province). This site, the earliest Paleolithic site so far discovered in Heilongjiang, includes important archaeological objects. The cave sediments contain about 100 stone implements and faunal remains representing twelve species, including Merk rhinoceros (the lower jaw), roe, badger, hare, bear, marmot, and marten. The remains of Merk rhinoceros were the first found in Heilongjiang, although the bones of the lower jaw, discovered in the gully Huangshanchonggou near Harbin city, are recognized only with difficulty. A uranium date of 175 ± 22 ka BP obtained from the rhinoceros teeth places this site within the early stage of the Late Pleistocene.

2. ***Shanchenzi fauna*** is represented by an assemblage of Late Pleistocene animal remains found in layers 7 and 8 of Miaohoushan cave. Among the main species identified are jerboa, Daurian pika (*Ochotona daurica*), Norway rat (*Rattus norvrgicus*), Chinese raccoon dog, cave bear, fox (*Vulpes* cf. *vulgaris*), spotted hyena, Prjewalski horse (*Equus przewalskji*), deer (*Cervus nippon, Cervus elaphus maral, Megaloceros ordosianus*), Pleistocene musk deer, Prjewalski gazelle (*Gazella przewalskji*), buffalo, and blue sheep (*Pseudois nayanr*). Currently existing species prevail, with extinct ones making up only 38.4%. This fauna group is similar to the Sharaosso-gol fauna. Its representatives usually inhabit steppe, arid or desert environments; thus it may be conjectured that during the Late Pleistocene the climate was more arid and cold than at present.

3. ***Hezidong fauna*** is represented by remains found on the Dalinghe River near the Wafangcun settlement (Shuiquan Region, Kazuo Prefecture, Liaoning Province) at 41°15' N, 124°50' E. The faunal remains were found within sediments of a cave formed in Ordovician limestone. They were discovered together with human remains and numerous lithic artifacts; a layer of ash was also found. Thus the cave represents a classic habitation site of prehistoric man. The extent of the cave sediments is rather large; the culture-bearing layer was composed of grayish-yellow sediments and inclusions of breccia. Bones of twenty-six animal species were found there. They mainly represent Daurian piping hare, great marmot, mole, zokor, Chinese cat, spotted hyena, brown bear, wolf, lynx, wild horse, red deer, Prjewalski gazelle, blue sheep (*Pseudois* sp. *nayanr*), and woolly rhinoceros.

The Hezidong fauna is characterized by the presence of representatives of both Pleistocene North Chinese and Dongbei ("woolly rhinoceros – mammoth") faunas. It is similar to the Sharaosso-gol fauna, in which extinct species make up 30.7%. The most widely represented are remains of the Prjewalski gazelle and spotted hyena. Argali, a frost-resistant animal, inhabits regions situated high above sea level. Thus it may be hypothesized that Hezidong man lived during the coldest period of the Pleistocene. Proceeding from stratigraphic characteristics, comparisons with surrounding terraces, the archaic appearance of stone implements, as well as from results of a comprehensive study of the mammal remains, the Hezidong site may be culturally attributed to the Middle Paleolithic, which corresponds to the middle period of the Late Pleistocene, i.e., to ca 70 – 50 thousand years ago.

4. ***Xianrendong fauna.*** The Xianren (dong) cave (Haicheng Prefecture) is the most important Paleolithic site in the Dongbei territory. Here, not only numerous Late Pleistocene mammal remains, but also fossilized human bones, more than 10 thousand lithic artifacts, bone implements and adornments have been found. The site is situated in the Gushan Manchurian Autonomous County (Haicheng city in southern Liaoning) at 40°3' N, 122°58' E. The bedrock is Early Xini marble of "cloudy whiteness." Layers 2 – 4 inside the cave are composed of breccia-containing fine sandy loam of yellow color. These layers contain archaeological remains. The identifiable faunal remains represent hamster, zokor (*Myospalax fontanieri*), Chinese raccoon dog, corsac, brown bear, cave bear, badger, spotted hyena, Chinese cat, Asian cheetah, mammoth (*Mammuthus primigenius*), boar, giantantler deer, red deer, Prjewalski musk deer, and bison. A characteristic feature of this fauna complex is an absolute dominance of Artiodactyla (71.5% of the sample), which is indicative of steppe environment. Remains of otter, buffalo, and Pekinese musk deer, normally living in wetland habitats with a warm climate, were also encountered. This proves that during the Late Pleistocene the climate changed many times. Thermoluminscent dates of 40 – 20 ka BP have been obtained for the site.

5. ***Xuetian fauna.*** At the Xuetian Paleolithic site (Longfenshan County, Wuchang Prefecture, Heilongjiang Province), lithic artifacts, bone implements and remains of eight animal species were found Although the species diversity of the fauna is not great, the bones are numerous. They mostly represent mammoth, bison, horse, deer, woolly rhinoceros, and zokor. Two AMS dates (35,010 ± 370 and 37,810 ± 420 BP) were obtained for the site

6. ***Yushu fauna.*** An accumulation of bones was found near the creamery of Zhoujia (Yushu Prefecture, Jilin Province) at 44°43' N, 125°21' E. The remains were found on the second loess terrace at the convergence of the Sungari and Lalin rivers, in a layer of gray loam with yellow hints. Bones of about thirty mammal species were previously found here.

Researcher Zhou Mingzhen considered them as belonging to the Yushu fauna. In the 1970s, the number of findings increased.

The fauna is represented by zokor (*Myospalax fontanieri*), spotted hyena, tiger, true mammoth, Sungarian mammoth (*Mammuthus sungari*), Prjewalski horse, woolly rhinoceros, Dongbei roe deer, elk (*Alces alces*), bison (*Bison exiguus*), Prjewalski antelope, and auroch. This is the classic "woolly rhinoceros – mammoth" fauna complex of the glacial period. Together with the faunal remains, lithic and bone implements of advanced type, culturally attributed to the Upper Paleolithic, were found. The available radiocarbon dates are 31 – 26 ka.

7. *Antu fauna* was recorded in a limestone cave located on the second terrace of the Buerhatong River in the vicinity of the Mingri(zhen) settlement (Antu Prefecture, Jilin Province). In the cave, fossilized teeth of *Homo sapiens* were discovered. In total, nineteen animal species were identified, among which carnivores prevail, followed by Perissodactyla and Artiodactyla. The majority of animals represent modern species within the framework of the classic "woolly rhinoceros – mammoth" fauna complex. Among them there are such animals as piping hare, wolf, raccoon dog, fox, brown bear, spotted hyena, lynx, tiger, true mammoth, Prjewalski horse, woolly rhinoceros, sika deer, red deer (Canadian) (*Cervus canadensis*), elk, and Dongbei bison (*Bison exiguus*).

According to the data of palynological analysis, Chinese spruce and fir grew in the cave environs. At present, they survive only in the Changbaishan Mountains at an altitude of over 1400 – 1800 m above sea level. Thus, Antu man lived under rather cold climatic conditions. Radiocarbon dates range from 35 to 26 ka BP, which chronologically correspond to the Sharaosso-gol fauna.

8. *Yanjiagang fauna* was found at one of the most important recently discovered sites in the Heilongjiang Province, on the second terrace of the Sungari River. In addition to human dwellings constructed of bones of large mammals, numerous bones representing twenty-nine mammal species were found at the site. Extinct species are represented by spotted hyena (*Crocuta ultima*), true mammoth, Sungari mammoth, woolly rhinoceros, Prjewalski horse, red deer, giantantler deer, Wang buffalo, and Dongbei bison; they form 24.1% of the fauna sample.

Large mammals, such as horse, giantantler deer, bison, antelope, mammoth, and rhinoceros dominate the fauna collection. People used limb bones of the large animals to construct the walls of their temporary dwellings. Bones of carnivores – wolf, red wolf, fox, stoat, hyena – and of Artiodactyla were also encountered, corresponding to a light forest and steppe environment. The Yanjiagang stratigraphic profile contains a comparatively thin layer of fossil soil of red-brownish color corresponding to a short episode of warm and humid climatic conditions. A radiocarbon date of 22,370 ± 300 BP was obtained for the site.

9. *Gulongshan fauna* was recorded near the Gulongshan stone quarry in the suburbs of Wafangdian city (Dalian District) at 39°41'15" N, 122°01'59" E. The faunal remains were discovered in a layer of clay sediments inside a cave formed in Cambrian limestone. The main animals identified are hedgehog, Dongbei piping hare, ground squirrel, migratory hamster (striped), mole, dog, red wolf, brown bear, steppe stoat, spotted hyena, Asian cheetah, horse (*Equus dalianensis*), woolly rhinoceros, true mammoth, giantantler deer, Dongbei sika deer, aurochs, Wang buffalo, spiral-horned antelope (*Spirocerus* sp.), and Prjewalski antelope.

The Gulongshan sample represents an immense volume of Late Pleistocene fauna of southeastern China, including fish, reptiles, birds, and mammals. The last include fifty-seven species dominated by rodents, carnivores, and Artiodactyla. Fossilized remains of horse (including the Dalian and Prjewalski horses) are numerous. About five thousand horse teeth, representing at least 140 individuals, have been found. A radiocarbon date of 17,610 ± 240 BP obtained for the cave corresponds approximately to the fauna of the Upper Grotto (Shandingdong).

10. *Qianyang fauna* was found in a cave formed in Ordovician limestone of the Majiagou suite (Qianyang County, in the region of the Eastern Port of Dandong city). A skull of late *Homo sapiens* and lithic artifacts were found, allowing the attribution of the site to the Upper Paleolithic. The fossils mainly represent Chinese zokor, Aman zokor, macaque, bear, badger, raccoon dog, southern badger, corsac, small boar, wolf, hyena, lynx, horse, red deer, roe deer, and wild boar. The species diversity of this fauna is not great. With only a river separating Qianyang from Korea, it marks an important migration route for North Chinese fauna from the Liaodong Peninsula to the Korean Peninsula. A radiocarbon date of 18,620 ± 320 BP was obtained for the layer containing remains of Qianyang man.

11. *Qingtoushan fauna.* Remains of late *Homo sapiens* and representatives of fauna dominated by small mammals were found on the terrace of the northern side of the Chaganpao River (Qianguo Prefecture, Jilin Province). By the species composition, the fauna corresponds to the Late Pleistocene – Early Holocene transition. Steppe rodents constitute the basic component of this fauna sample, e.g., five-toed jerboa, Dongbei zokor, Brandt vole, marmot (*Marmota bobac*), and Daurian ground squirrel. In addition, remains of woolly rhinoceros, Prjewalski horse, wild boar, deer –

Correlation of data on the Quaternary mammal fauna in Dongbei and in the regions of North China

Geological periods	Absolute dates	Archaeological periods	Classical stratigraphic scale	North China	Liaoning Province	Jilin and Heilongjiang Provinces
Late Pleistocene Q_3	10 ka	Upper Paleolithic	Malan loess	Shandingdong, Beijing city; Zhiyu (Shiyu), Shanxi Province	Bajianfang, Lingyuan Prefecture, Shenjiatai, Jinxian Prefecture, Gulongshan, Dalian city (17,610 ± 240), Qianyang, Dandong city (18,620 ± 320); Xianrendong, Haicheng Prefecture (40 – 20 ka)	Zhalainor, Qingtoushan, Jilin Province (10,940 ± 170), Fusong, Jilin Province; Yanjiagang, Heilongjian Province (22,310 ± 300); Yushu, Jilin Province (31 – 26 ka); Xuetian (Experimental Field) in Wuchang, Heilongjian Province (42 – 34 ka)
	50 ka	Middle Paleolithic		Xujiao, Hebei Province, Dingcun, Shanxi Province; Dali, Shaanxi Province	Hezidong, Kazuo Prefecture (70 – 50 ka)	Acheng, Heilongjian Province (17.6 ka)
Middle Pleistocene Q_2	200 ka	Lower Paleolithic	Lishi loess	Zhoukoudian-1, Beijing city; Chenjiawozi, Shaanxi Province, Gongwangling, Shaanxi Province	Anping, Liaoyang city; Zangshan, Yingkou city, Jinniushan, Yingkou city (310 – 200 ka), Maoershan, Kazuo Prefecture, Miaohoushan, Benxi city (400 – 140 ka)	
Early Pleistocene Q_1	1 Ma 3 Ma		Wucheng loess	Nihewan, Hebei Province	Haimao, Dalian city (1.6 – 1.2 Ma)	

thirteen species, in total – were found, most of which represented modern species. Some elements of the "woolly rhinoceros – mammoth" fauna complex were also recorded. The climatic conditions corresponding to this complex were characterized by the Dali glacial maximum at the end of the Pleistocene, synchronous to Würm in Europe and Wisconsin in North America. This fauna collection may serve as a base for a deeper investigation of changes of the "woolly rhinoceros – mammoth" complex of the Late Pleistocene. A radiocarbon date of 10,940 years BP places this fauna at the final stage of the Late Pleistocene.

Conclusions

Apart from the specificity of the dated fauna complexes mentioned above, we can single out some general characteristics of the mammal fauna discovered in Dongbei to the present.

1. The Quaternary mammal fauna of Dongbei is extremely rich. To date, classic fauna complexes representing the Early, Middle and Late Pleistocene have been recorded, which is conducive to the construction of reference profiles for each stage of Quaternary stratigraphy of Northeast China.

2. A comparatively large amount of materials representing the Middle Pleistocene fauna of this region has been found. The main species are the same as those in the Zhoukoudian fauna of North China, e.g., macaque, sabre-toothed tiger, Chinese striped hyena, raccoon dog, Sanmen horse, Merk rhinoceros, Lydekker wild boar, giantantler deer, Trogontherium Juya beaver, and Zdansky beaver. Evidently, migration of Middle Pleistocene fauna from North to Northeast China had taken place. Presence of contacts between regions was reflected in archaeological cultures, too. In addition, the stratigraphy of Dongbei sites of the period under consideration is similar to the sequence of sediments of the upper part of Zhoukoudian. For example, the coexistence of the remains of red deer with those of giantantler deer, and Chinese striped hyena with spotted hyena proves that the above-mentioned sites correspond to the late period of the Middle Pleistocene.

Among the Quaternary faunal remains discovered during many years of study in the territory of Jilin and Heilongjiang provinces – the Yushu, Guxiangtun and Zhalainor – a section of Late Pleistocene stratigraphy with the Dongbei "woolly rhinoceros – mammoth" fauna is represented. Among the latest findings, fossils of Middle Pleistocene animals found in the Liaoning Province should be mentioned. However, in the Jilin and Heilongjiang provinces no clear evidence of fauna of this epoch has been found. Remains of Merk rhinoceros discovered in Acheng (Heilongjiang Province) in the 1990s prove that the warmth-loving animal spread north of the 45th parallel (at present, this is the northernmost location of Merk rhinoceros) and existed in Northeast China as early as the initial period of the Late Pleistocene, i.e., 17,500 years ago.

3. All the faunal remains of various periods studied to present have been found in cave sediments, the majority accompanied by remains of ancient man and lithic artifacts. Evidently, large accumulations of animal bones occur only at dwelling places of Paleolithic man. There was an unbreakable bond between man and fauna. In terrigenic and lacustrine-fluvial sediments, only fragments of fossilized faunal remains have been found. Much zooarchaeological data have been gathered, which should prove useful for the study of research problems associated with Paleolithic sites, such as the manufacture of stone implements and man-made traces on the surface of bones, and pathology of animal bones and teeth.

Some patterns in the distribution of Quaternary mammal fossils in Dongbei have been observed. The bone accumulations are most frequently encountered in the southern part of the region and less often in the north; they are more often found at the junction of plains and piedmonts, and less often in high mountainous regions; they normally occur on the first and second terraces of rivers, and less frequently on high terraces.

4. Within a time span between ca 33 and 11 thousand years ago, in Dongbei there appeared mammals adapted to the conditions of a comparatively cold climate. For example, in the Hezidong, Gulongshan, Yushu and Yanjiagang faunas, classic representatives of the "woolly rhinoceros – mammoth" fauna complex have been recorded, specifically those animals characteristic of the circumglacial climate, such as spotted hyena, horse, aurochs, and bison.

According to the available archaeological data, woolly rhinoceros did not pass over the Bering Strait into North America. In China, the southernmost limit of its habitat reached 31° N, which is beyond the southern limit of the zone of mammoth habitation (39° N). From this it follows that the adaptation characteristics of the woolly rhinoceros differed from those of other animals of the glacial period. It does not belong to classic species which are widely represented in the natural conditions of circumglacial zone, and for this reason, in the opinion of some researchers (Zhou Mingren, 1991), it is more correct to speak of "mammoth fauna", not "woolly rhinoceros – mammoth fauna."

Andersson ostrich (*Struthio anderssoni*) represents a species that lived under dry climatic conditions in semideserts or deserts. The fauna of the Liaoning and Jilin provinces, where fossilized ostrich eggs were found, and that of North China within the framework of the Malan loess period of the Late Pleistocene, may be considered as similar.

Mammoth that existed during the Late Pleistocene belongs to a group of frequently occurring species characteristic of cold climatic conditions. In China, the northern boundary of its habitat exceeded 52° N, while the southern limit ran along the southern extremity of the Liaodong Peninsula. Remains of mammoth have recently been discovered in the Huanghe River basin, the Hebei and Shanxi provinces, and the autonomous region of Inner Mongolia. Migrating humans followed mammoth, an important object of hunting and source of food, to various regions of Siberia, North America and East Asia. An analysis of archaeological data demonstrates that the latest layers with buried remains of mammoth correspond to the end of Late Pleistocene (ca 10 ka BP). So far they have not been found in the Holocene layers. Specialists believe that global climatic warming in the Holocene was a cause of extinction of mammoths. Therefore the mammoth remains are important for the analysis of the climatic situation in the Late Pleistocene.

5. The Liaoning Province, situated in the southern part of Dongbei, is characterized by a complicated topography. In the species composition of fauna, the specificities of transition from the North Chinese (Huabei) fauna to the classic "woolly rhinoceros – mammoth" fauna complex are manifested. That is why it is difficult to define the attribution of some species to the northern or to the northeastern fauna. For example, the Middle Pleistocene fauna of Zhoukoudian contains a large number of classic species, such as Sanmen horse, Merk rhinoceros, Chinese striped hyena, macaque, giantantler deer, Andersson beaver, Young panther, and water deer. They are also often found in the Middle Pleistocene layers of Liaoning. Classic species of the Dongbei Late Pleistocene "woolly rhinoceros – mammoth" fauna complex (giantantler deer, spotted hyena) were widespread in the territory of North China and Northwest China up to the Yangzi basin. Representatives of southern fauna, such as Wang buffalo, otter, water deer, and Pekinese musk deer have been found in both Liaoning and Jilin. This proves that during the onset of interglacial period, many representatives of the southern fauna migrated to the north in search of an appropriate natural environment, although they did not cross the border, corresponding to 44° N, between the modern Jilin and Heilongjiang provinces.

6. Migration of Late Pleistocene mammals was caused by climatic conditions, since mammals are as responsive to climate changes as plants are. Evidence of this can be found in the remains of some animal species in Dongbei and other regions of China. At the end of the Late Pleistocene (ca 50 – 10 ka BP), under the influence of the Dali glaciation in China, Würm in Europe, and Wisconsin in North America, some animal species migrated either to the north or to the south. That is why the Quaternary mammal remains found in Dongbei have great importance for studying the spread of Quaternary fauna and the paleoclimatic changes in the territory of China and other regions of East Asia, Siberia and North America.

7. In the region under study, fossil remains of the Late Pleistocene fauna are well represented; they may be arranged in chronological sequence (Table). However, the faunal remains of the Early Pleistocene and the initial stage of the Middle Pleistocene are very scarce; that is why the further search for such materials is an urgent research task.

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DISCUSSION

THE ISSUE OF THE MIDDLE TO UPPER PALEOLITHIC TRANSITION

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MIDDLE PALEOLITHIC INDUSTRIES WITH FOLIATE BIFACES IN GORNY ALTAI*

Introduction

Understanding the diffusion of bifacial flaking techniques within the Paleolithic industries of North Asia is a crucial problem in the study of the earliest human occupation of this territory. This question is central to our comprehension of practically every stage of the development of Paleolithic culture. The task of identifying characteristic Lower Paleolithic features depends in part on establishing boundaries for the geographical dispersal of sites with bifaces as a principal criterion for dividing Pleistocene Eurasia into two major cultural areas: a western zone with Acheulian-type handaxes and Levallois technology and an eastern zone dominated by so-called chopper-chopping tools and pebble tool technology (Movius, 1944; Ranov, 1965; Okladnikov, 1966). In Middle Paleolithic stone industries, the presence of bifacial elements in the Levallois reduction strategy attests to the Western affinities of the Mousterian tradition and allows researchers to establish the border delimiting the eastward dissemination of these traditions in Asia (Okladnikov, 1968; Ranov, 1990; Jaubert, 1999). The occurrence of bifacially worked specimens in late Paleolithic technocomplexes may serve as a basis for classification of the Upper Paleolithic collections of Siberia and contiguous Asian territories. Additionally, the presence of bifacially worked points in archaeological assemblages represents one of the most important lines of evidence in establishing the routes of initial human penetration into the Americas from Northeast Asia (Mochanov, 1969; Abramova, 1973; Derevianko, 1975; West, 1981; Yi Seonbok, Clark, 1985; Morlan, 1991; American Beginnings, 1996).

Among the various types of bifacially worked tools recorded in Siberian Paleolithic technocomplexes, foliate bifaces seem the most important. Such implements might have served as knives or as armatures for spears and javelins. Foliate bifaces represent a specific type in tool kits reflecting local features in the development of Paleolithic cultural traditions. Elucidation of the chronometric period and geographical location of the first appearance of foliate bifaces in North Asia is one of the most important aspects of Paleolithic studies.

Historically, bifacially worked lithic tools were recorded at the Military Hospital (Voenny Gospital) site in Irkutsk, the first Paleolithic site identified in Siberia in 1871, where foliate bifaces were uncovered in association with unique *objets d'art* fashioned of mammoth tusks and adornments made of red deer teeth (Chersky, 1872). However, shortly after the discovery of this Paleolithic site, the archaeological materials recovered were lost; sadly, the first Russian collection of Paleolithic artifacts is now preserved solely in the form of a few illustrations and descriptions (Uvarov, 1881; Larichev, 1969).

The first true biface, representing one of the earliest such specimens discovered in Siberia, was recovered from Ust-Kanskaya Cave in the Altai Mountains in association with Levallois Mousterian-like implements and animal fossils, suggesting attribution of the whole assemblage to a warm and dry stage of the Upper Pleistocene (Rudenko, 1960, 1961). Unfortunately, artifact cataloguing was done without reference to stratigraphic position, and the lithic collection includes Mousterian tools together with several classic Upper Paleolithic implements and specimens of worked bone.

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As the Ust-Kanskaya Cave artifacts were not mapped with indications of their stratigraphic provenience, a few implements were classified into a separate Upper Paleolithic category on the basis of their morphology being different from the associated Mousterian specimens (Astakhov, 1966; Anisiutkin, Astakhov, 1970; Shunkov, 1990). Age estimates for the foliate biface present considerable difficulties. This tool exhibits a perfect classical form, and its surface is damaged by eolian abrasion to a heavier degree than that noted on other implements. Judging from the state of its surface abrasion, this biface cannot be younger than the Initial Upper Paleolithic. Despite the debatable status of this date, this implement has long been regarded as the earliest foliate biface from Siberian Paleolithic collections.

Currently, industries including bifacially worked tools have been reported from many Paleolithic sites in North Asia. Bifacially worked tools are usually included within Upper Paleolithic industries. These mostly classically shaped tools are usually not particularly numerous, hence they do not determine the overall typology of such lithic collections. However, in some collections foliate bifaces form a separate typological series and represent a diagnostically characteristic feature. For example, collections from such sites as Tiumechin-4 in the Central Altai, Mokhovo-2 in the Kuznetsk Depression, sites located on Derbinski Bay at the Krasnoyarsk Dam on the Enisei, sites in the Selemzha Basin in the Amur region (Priamurye), and various sites included in the Dyuktai complex in Yakutia, reveal the most vivid examples of the bifacial tradition. Despite the seemingly patchy territorial distribution of foliate bifaces during the Upper Paleolithic in Siberia, certain regularity may still be noted. Thus, industries with bifaces evidently attributable to the Initial Upper Paleolithic have been reported from southwestern Siberia: from Gorny Altai (Ust-Karakol-1, Tiumechin-4, Denisova Cave) and from the Kuznetsk Alatau range (Mokhovo-2) (Derevianko et al., 1992; Arkheologia..., 1998). Another series of sites yielding bifacially worked points probably attributable to the above period includes: Kashtanka IA, Derbina IV and V, and Ust-Malat I and II on the Upper Enisei (Akimova, Stasiuk, 2001), although chronometric attribution of these artifacts must still be verified. However, during the middle Upper Paleolithic, bifacially worked points were already dispersed over a considerable portion of Middle Siberia: the Tarachikha site in the Minusinsk Depression (Abramova, 1983), the sites of Ust-Kova and the third chronometric group of sites located in the Angara-Oka basin in the north Angara area (Vasilievsky, Burilov, Drozdov, 1988; Volokitin, 1990) are cases in point.

Foliate bifaces have also been reported from eastern North Asia: Sokhatino-4 in the eastern Trans-Baikal (Okladnikov, Kirillov, 1980), sites located on the Ulma estuary and near Kumary village in eastern Priamurye (Derev'anko, 1990; Derevianko, 1983; Derevianko, Zenin, 1995), and sites of the Dyuktai archaeological culture located throughout Yakutia (Mochanov, 1977) far northeastern Asia. Bifaces have been also recorded from Berelekh, the northernmost known Paleolithic site in the Indigirka Basin (Vereshagin, Mochanov, 1972). Though many of these sites need more precise chronometric attribution, most of their archaeological materials evidently belong to the final Upper Paleolithic (Abramova, 1979, 1989; Yi Seonbok, Clark, 1985). The earliest archaeological remains on Kamchatka from Lake Ushki (Dikov, 1979), yielding bifacial stemmed points, polished knives, and other unique implements which are not characteristic of the North Asian Paleolithic, are probably also attributable to the Upper Paleolithic.

The tendency for the northeastward dispersal of Upper Paleolithic industries with foliate bifaces from southwestern Siberia allows us to trace possible migration routes of early Americans bearing the bifacial tradition. This technical tradition most likely originated in Acheulian type Upper Paleolithic technocomplexes in Central Asia. On the other hand, there is a chronological gap in available archaeological evidence illustrating the tradition of bifacial flaking in Central Asia. However, some sites yielding artifacts of the relevant cultural and chronometric affinities have recently been reported.

Foliate bifaces are recorded in most Mousterian technocomplexes on the Russian Plain and constitute the typological kernel of the so-called "Eastern Micoquian" together with other bifacial forms, while pointed bifaces are rarely reported from sites with Middle Paleolithic industries located east of the Urals. Most of these later sites have been discovered in Gorny Altai.

The middle Anui River valley represents the core area of Paleolithic studies in Gorny Altai. The valley is situated in the northwestern portion of the Altai Mountains where a variety of stratified cave and open-air sites has been discovered. Deposits at these sites reveal a continuity of human occupation horizons dating from the late Acheulian – early Mousterian periods to the final stages of the Upper Paleolithic. The Pleistocene deposits of such archaeological sites also yield rich bio-stratigraphic data reflecting environmental conditions occurring at various paleogeographic periods during the Quaternary (Arkheologia..., 1998; Derevianko et al., 2001). Among other Paleolithic sites located within the Anui valley, the open-air sites of Ust-Karakol-1 and Anui-3 seem very important, as the archaeological materials recovered from these sites illustrate the development of technological traditions of the early population of the Altai. These sites yielded archaeological collections containing classical Middle and Upper Paleolithic implements; typical foliate bifaces were identified within the Middle Paleolithic series. This fact adds to

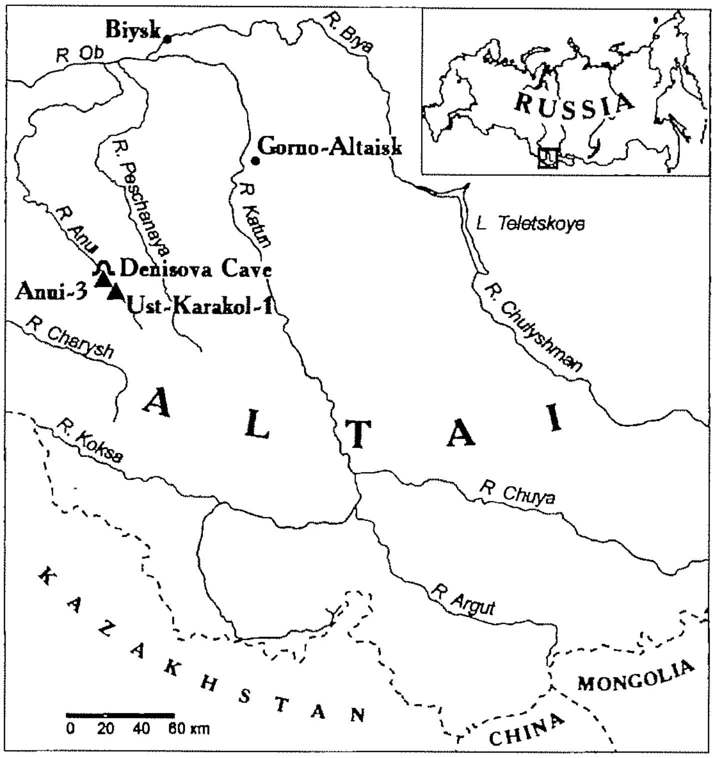

Fig 1 Map showing the location of major Paleolithic sites in the northwestern part of Gorny Altai

the importance of these sites among other Paleolithic sites, not only in the Altai, but in North Asia in general.

Stratigraphy, paleogeography, and geochronology

The well-stratified archaeological site of Ust-Karakol-1 has provided the richest information on the local Paleolithic (Derevianko, Markin, 1995; Derevjanko, Šun'kov, 1998). It was located in two kilometers up the Anui from Denisova Cave at N 51°22'50", E 84°41'20" (Fig. 1). The site is situated at the bottom of a gentle slope forming a spit at the confluence of the Anui and Karakol rivers (Fig. 2).

The site excavations have exposed a sequence of Pleistocene deposits up to 6.5 m thick. The stratigraphic column is subdivided into 20 major strata reflecting various sedimentation cycles (Fig. 3). The lowermost stratum 20 is composed of cobble-pebble alluvium filled with sand and gravel. This alluvial stratum lies 2.2 – 4.2 m above the current shoreline. The upper border of the alluvial stratum is uneven; it demonstrates erosional fissures and depressions filled with sandy and loamy sediments of the sandbank and creek facies (stratum 19). The overlying stratum 18 is a dark, dense clay and loam permeated with debris. Sediments of this stratum may originate in the floodplain loam and soil suffused with talus rocks.

The overlying stratigraphic unit represents a series of sub-aerial deposits. The lowermost portion of this unit comprises strata 17 to 12. They are composed of dense and moderately dense reddish-brown loam with lenses and laminations of concentrated debris. Strata 11 to 5 form the middle portion of this unit. The sediments comprising this unit are composed of loose to medium loessic loams of brown to light brown coloration intercalated with layers of buried soil. Two humus-containing layers (strata 8 and 5) represent well-developed paleosols. These layers are separated by debris (stratum 7) and light brown clayey loam layers including lenses of humic sediments (stratum 6). The morphology, texture, and relative position of strata 6 and 5 suggest their attribution to a single paleosol. Strata 11 to 9 comprise a lens (or tongue) shaped structure, dark laminations and spots of humus-containing sediments. Their stratigraphic position suggests attribution to different horizons of a weak buried soil, possibly a single paleosol complex including stratum 8. The uppermost portion of this unit (strata 4 – 1) is a loose loessic loam with a granular texture. The sediments form prismatic columns with vertical fissures delimited by a cobble and gravel layer at the bottom (stratum 4) and a layer of modern soil containing humus at the top (stratum 1).

A total of five human occupation horizons has been identified within the Pleistocene deposits at the site: stratum 19 contained early Middle Paleolithic

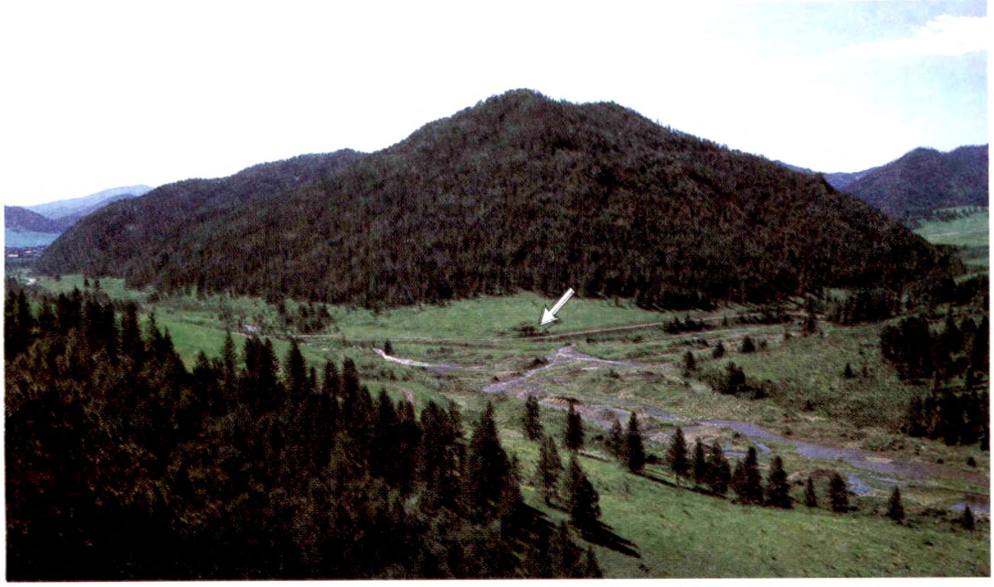

Fig. 2. A view of Ust-Karakol-1.

archaeological materials; strata 18 through 13 bore Middle Paleolithic artifacts; strata 11 through 8 yielded artifacts attributable to the Initial Upper Paleolithic; stratum 5 revealed artifacts of the middle Upper Paleolithic; and final Upper Paleolithic archaeological materials are associated with strata 4 through 2. Practically all strata have yielded animal fossils together with Paleolithic artifacts; pollen samples produced a high content of spores and pollen of different species (Baryshnikov, 1998; Malayeva, 1998; Agadjanian, Shunkov, 2001).

Several RTL dates have been generated for this site. The lowermost alluvial portion was dated to the Middle Pleistocene. The floodplain facies (stratum 20) yielded two dates: 210 ± 42 ka (RTL-640) and 207 ± 41 ka (RTL-662). The upper portion of the alluvial sediments (stratum 19) has been dated to 133 ± 33 ka (RTL-661). Analyses of pollen spectra and small animal bones suggest the predominance of steppe and meadow biotopes during that period. Forest communities of birch and pine trees with an admixture of coniferous and broad-leaved species occupied small portions of the river valley. Formation of the sub-aquatic deposits occurred under the conditions of a relatively cool climate associated with the Tazovsky (R_{III}) period (oxygen isotope stage 6).

The alluvial sediments are overlain by the hydromorphic floodplain deposits with the RTL dates of 100 ± 20 ka (RTL-659) for the lowermost portion of stratum 18 and 90 ± 18 ka (RTL-658) for its uppermost portion. The border between strata 18 and 19 exhibits features typical of a sedimentation process hiatus. The sporo-pollen spectra generated for strata 19 and 17 (no pollen was detected in stratum 18) do not suggest an evolutionary successive development of vegetation. They

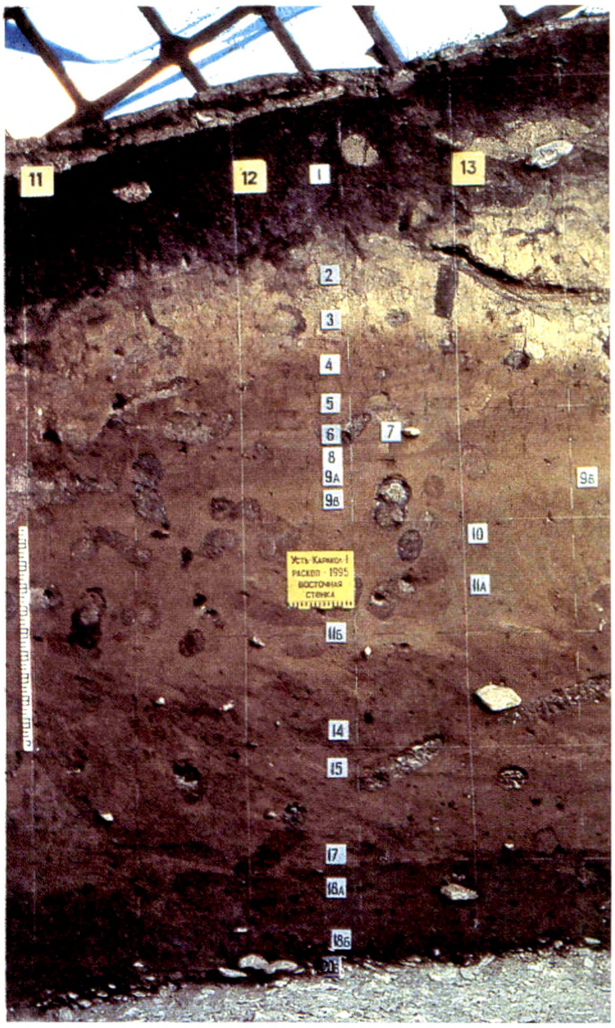

Fig. 3. The Ust-Karakol-1 profile showing Pleistocene sediments.

suggest a long hiatus in sedimentation processes occurring during the Kazantsevian (R-W) period (oxygen isotope sub-stage 5e) and a short cold episode occurring during the oxygen isotope sub-stage 5d.

The small mammal population associated with that sedimentation period includes various voles (e.g., *Clethrionomys* sp., *Microtus oeconomus*) and lemmings (Tribe Lemmini), while the number of ground squirrels (*Spermophilus undulates*) and zokor (*Myospalax myospalax*) is relatively minor. The small mammal composition and the RTL dates suggest that stratum 18 was accumulated under cool and wet climatic conditions of the initial Ermakovian (W_I) period (oxygen isotope sub-stage 5c).

The lower portion of the sub-aerial deposits was accumulated during the consequent stages of the Ermakovian period. Sporo-pollen spectra generated for the Mousterian occupation strata 17 – 14 (oxygen isotope sub-stages 5a – 5b), as well as the identified terrestrial faunal remains suggest dry and relatively warm environmental conditions favorable for the expansion of birch-pine forests with an admixture of broad-leaved species. Sediments from strata 13 and 12 (oxygen isotope stage 4) correspond with a period of colder and more arid climatic conditions Palynological analysis documents a decline in *Pinus* pollen in the composition, as well as a decrease in broad-leaved taxa together with a notable increase in the percentage of grasses. The small animal fauna identified within these strata suggests a reduction in forested areas with a simultaneous increase in steppe massifs. Moles (*Asioscalops* sp.) are practically absent in the bone collections from these strata, while the number of zokor becomes considerably less, suggesting regular soil frost penetration On the other hand, the available pollen spectra show the presence of broad-leaved taxa, indicating that the climate was not particularly cold.

The sediments comprising the middle portion of the profile (strata 11 through 5) were formed after a sedimentary hiatus, suggested by specific lithological and bio-stratigraphic features. Charcoal and humus-containing soil samples were collected from fireplaces associated with strata 10, 9, and 5. A series of radiocarbon dates was generated on these samples allowing the attribution of this unit to the Karginian (W_{II}) period (oxygen isotope stage 3): 35,100 ± 2850 yrs BP (SOAN-3259) for the upper portion of stratum 10; 33,400 ± 1285 yrs BP (SOAN-3257) for the lowermost portion of stratum 9, 29,860 ± 355 yrs BP (SOAN-3358), and 29,720 ± 360 yrs BP (SOAN-3359); 27,020 ± 435 yrs BP (SOAN-3356), 26,920 ± 310 yrs BP (SOAN-3356Г), and 26,305 ± 280 yrs BP (SOAN-3261) for stratum 5. Also, an RTL date of 50 ± 12 ka (RTL-660) was generated on a sample of burnt soil collected from beneath a fireplace in the lowermost portion of stratum 9. The late uptake RTL date is rather close to the early uptake ^{14}C date for the upper portion of stratum 10. Thus, an age estimate of ca 38 ka is proposed for stratum 9.

Analyses of the pollen spectra and small mammal remains from strata 11 – 8 showed a considerable increase in meadow and forest communities under relatively cold and wet climatic conditions. The pollen spectra demonstrate an increase in the proportion of coniferous species, including spruce and cedar pine. The small mammal faunal composition displays two major tendencies: a decrease in the proportion of ground squirrels and an increase in the proportion of burrowing animals. Also, bones of field voles (*Clethrionomys* sp), squirrels (*Sciurus* sp.), and lemmings of the Tribe Lemmini were noted.

The next climatic phase began during the period of deposition of the upper portion of stratum 8; sediments of strata 7 through 5 reflect these new climatic conditions in full. Available sporo-pollen spectra suggest unstable climatic conditions. The initial phase is characterized by diminished forest areas, and the subsequent restoration of forests. Judging from the available small animal bone collection, the formation period of stratum 7 was characterized by the greatest distribution of mountain-steppe biotopes with the simultaneous decrease in meadow communities. The faunal collection associated with strata 6 and 5 revealed the opposite process: an increase in the populations of hamster (*Cricetus* sp.) and zokor that is suggestive of the expansion of meadows together with contracting steppe massifs. In general, this climatic phase was characterized by warmer and less humid conditions than during the preceding period.

The combination of paleogeographic data obtained from the sediments of strata 4 – 2 reflects environmental conditions occurring during the final stage of the Upper Pleistocene: the Sartan (W_{III}) period (oxygen isotope stage 2). This period is characterized by the deterioration of climatic conditions and consequently by the disappearance of mixed forests with broad-leaved species. Gradual reorganization of vertical vegetation zones resulted in the appearance of vegetation types typical of this area today. The microfaunal composition established for the uppermost portion of the Ust-Karakol-1 profile revealed mostly bones of meadow and meadow-steppe species. The composition of the small mammalian taxa suggests a considerable reduction of forest biota that corresponds to a general cooling of the climate, which reached its maximum during the accumulation of stratum 3.

The Anui-3 (Derevianko, Shunkov, Ulianov, 2000) open-air site represents a well-stratified Paleolithic locality in the lower portion of a gently sloping (7 – 10°) high terrace on the left bank of the Anui River. It is located at N 51°23'35", E 84°40'49" 1.3 km downstream from the Karakol River mouth (see Fig. 1, 4).

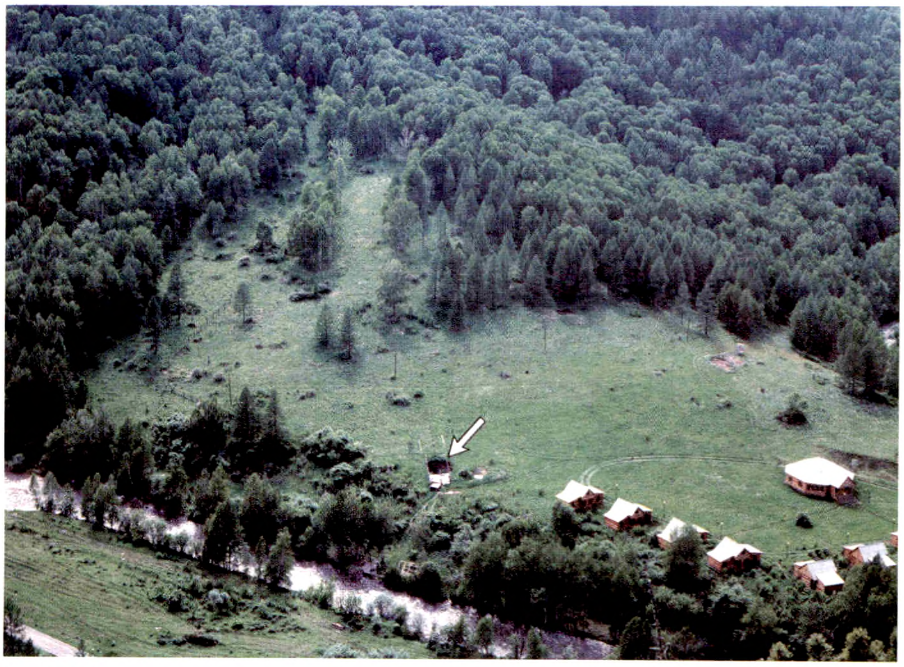

Fig. 4. A view of Anui-3.

The Anui-3 archaeological profile (Fig. 5) has exposed alluvial and slope sediments six meters thick, composed of a cobble-pebble horizon filled with sandy loam (stratum 21) reaching bedrock. Pebbles of various petrographic structures demonstrate moderate roundedness (classes 2 and 3), suggesting their alluvial origin. The layer of riverbed alluvium is overlain by a stratum of greenish sandy loam (stratum 20) typical of sediments originating in sandbanks and creeks near the main riverbed. Above, a layer of dense, brown loam was identified. This layer represents an intercalation of thin laminations of loam of various colors: whitish, greenish, and light brown (stratum 19). Stratum 18 is comprised of dense to medium-dense, light brown loam. Ferrous-manganese formations were noted within this stratum, suggesting hydromorphic conditions of pedogenesis. Thus, these sediments originate from the floodplain soil.

The middle portion of this profile (strata 17 – 13) includes dense loam sediments of varying coloration from white and light gray to yellowish-red and dark brown intercalated with debris and gravel layers. These dense sediments demonstrate pelitomorphic and lamellar structures.

Higher in the column, a stratigraphic unit of loose loessic loam laminated with debris layers was noted (strata 12 through 4). Strata 12 – 10 contain lamellar, slightly porous light-brown loam. Inclusions of denser grayish-light brown loam were also noted. Strata 9 to 7 contain layers of gravels filled with dense loamy sediments. These strata include lenses and laminations of yellowish-red loam saturated with gravel as well as numerous ferrous stains. Stratum 6 is comprised of dense,

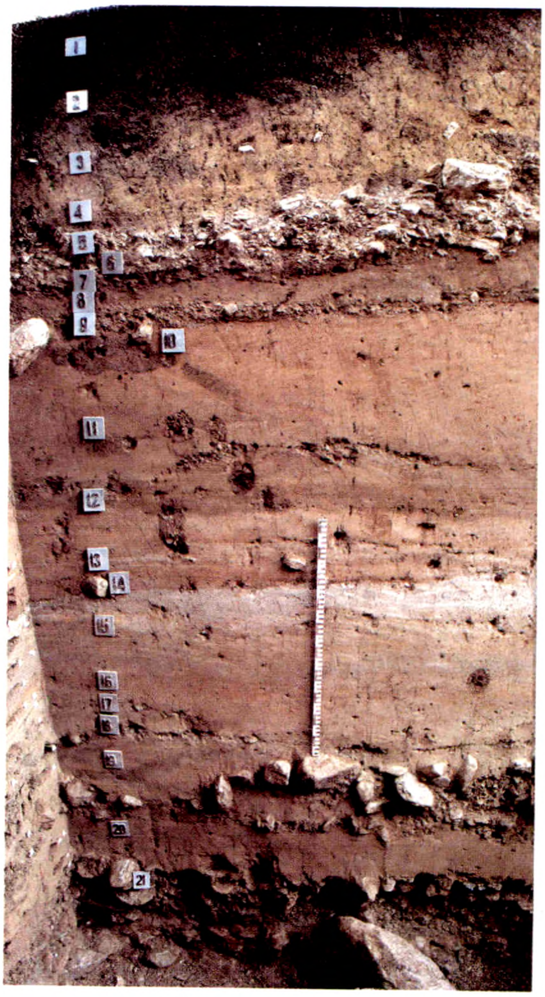

Fig. 5. The Anui-3 profile showing Pleistocene sediments.

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viscous, elastic loamy sediments, in which brown layers are intercalated by thin laminations of dense, elastic, whitish-gray sandy loam. Strata 5 and 4 are composed of a dense, light-brown loam and a horizon of fine to coarse gravel permeated with dense homogeneous sediments

The uppermost portion of the Pleistocene deposits (strata 2 and 3) is a light-brown, loose, fine-grained, loessic loam of indistinct vertical structure and small fissures in the upper portion of this unit, and light-brown loam sediments of a dusty texture and a peculiar lens and lamellar structure in the lower portion.

Within the Anui-3 Pleistocene deposits, ten culture-bearing horizons have been established: strata 18, 16, 15, and 13 yielded Middle Paleolithic artifacts, while strata 12, 11, 9, 4, 3, and 2 revealed Upper Paleolithic artifacts.

The collection of small animal bones recovered totals more than 1,500 identifiable specimens of at least 30 different taxa (Agadjanian, Shunkov, 1999). Judging by the changes noted in the composition of the small mammal community, three major periods of varying environmental conditions may be established.

The lowermost portion of this profile has yielded solitary bones of mole (*Asioscalops* sp.) and zokor (*Myospalax myospalax*), few remains of *Sorex* shrews, forest vole (*Clethrionomys* sp.), and also examples of *Lagurus* sp., *Stenocranius gregalis*, and *Microtus oeconomus*. The number of *Spermophilus undulates* is rather great, while bones of *Alticola* sp have not yet been found. In general, this species composition suggests cool and relatively humid climatic conditions, under which sediments of strata 18 – 13 were accumulated. The very small number of identified burrowing animals suggests considerable frost penetration into the soil during winter months.

On the contrary, the bone collection associated with the middle portion of the profile (strata 12 – 5) shows a sharp increase in the proportion of burrowing animals including the mole and, especially, zokor, together with a large number of *Lagurus* sp. Remains of *Clethrionomys* sp. and *Alticola* sp. are always present in these faunal collections. The numbers of *Ochotona* sp. are constant throughout this portion of the profile. The changes noted in the composition of small mammals allow us to hypothesize improved climatic conditions during the period of the accumulation of strata 12 – 5, principally warmer and probably less humid conditions in comparison to the preceding period.

Minor climatic fluctuations were also noted on the basis of changes in the proportions of different species' remains within the faunal collections. Thus it was established that the period of deposition of stratum 16 differed from that of stratum 18 in the former's more humid conditions, and the period of accumulation of stratum 15 seems to be the most favorable for biotic florescence.

The subsequent chronometric period also bore witness to several climatic fluctuations. For instance, the period of deposition of stratum 10 witnessed an increase in the population of *Stenocranius gregalis* and *Ochotona* sp. together with a decrease in the number of forest taxa and burrowing mammals. The changes noted in the proportions of various species represented suggest a distinct cooling and aridification of the climate leading to the constriction of forested areas and intensification of slope processes. The stratum 9 faunal collection reveals the restoration of the *Clethrionomys* sp. population. In addition, this collection includes the maximum representation of this species, suggesting a considerable increase in forested massifs. The strata 8 and 7 faunal collections indicate an increase in meadow-steppe animal populations. Relatively high zokor and *Ochotona* sp. populations suggest another period of gradual aridification of the climate with probable higher summer temperatures. Strata 6 and 5 provide evidence of ameliorated climatic conditions. The relevant small mammal community is dominated by steppe and meadow species, representatives of nival and forest biotopes are also present.

The strata 4 – 2 sediments illustrate the latest stage in environmental development. The population of small mammals reflects the following ratio: the proportions of *Lagurus* sp. and forest vole (*Clethrionomys* sp.) have decreased, while *Alticola* sp. is not noted at all. On the other hand, the percentage of zokor remains has increased, and new species appear, including *Asioscalops* sp., *Microtus oeconomus*, *Apodemus* sp , *Allocricetus eversmani*, *Ellobius* sp., and *Arvicola* sp Such changes in the small mammal population suggest more humid conditions and lower annual temperatures during the period of deposition of strata 4 – 2.

Chronometric estimates for the Anui-3 profile have been carried out principally on the basis of correlation with lithological units established for the Ust-Karakol-1 profile (Fig. 6), which is located 1.3 kilometers upstream from the Anui.

The lowermost portion of the Anui-3 profile (stratum 21) represents a cobble-pebble accumulation of riverbed alluvial origin; this stratum lies 3.7 m above the current riverbank. The relevant stratum in the Ust-Karakol-1 profile revealed a layer of pebble alluvium, for which an RTL date of 210 – 270 ka is available. Judging by its stratigraphic position, the cobble-pebble layer at Anui-3 is likely of Middle Pleistocene age

Strata 20 – 18 contain alluvial floodplain sediments. Strata 19 and 18 represent a paleosol that was shifted and buried as a result of slope processes. These sediments are best correlated with the hydromorphic soil of stratum 18 in the Ust-Karakol-1 profile, which is dated in the range of 100 – 90 ka.

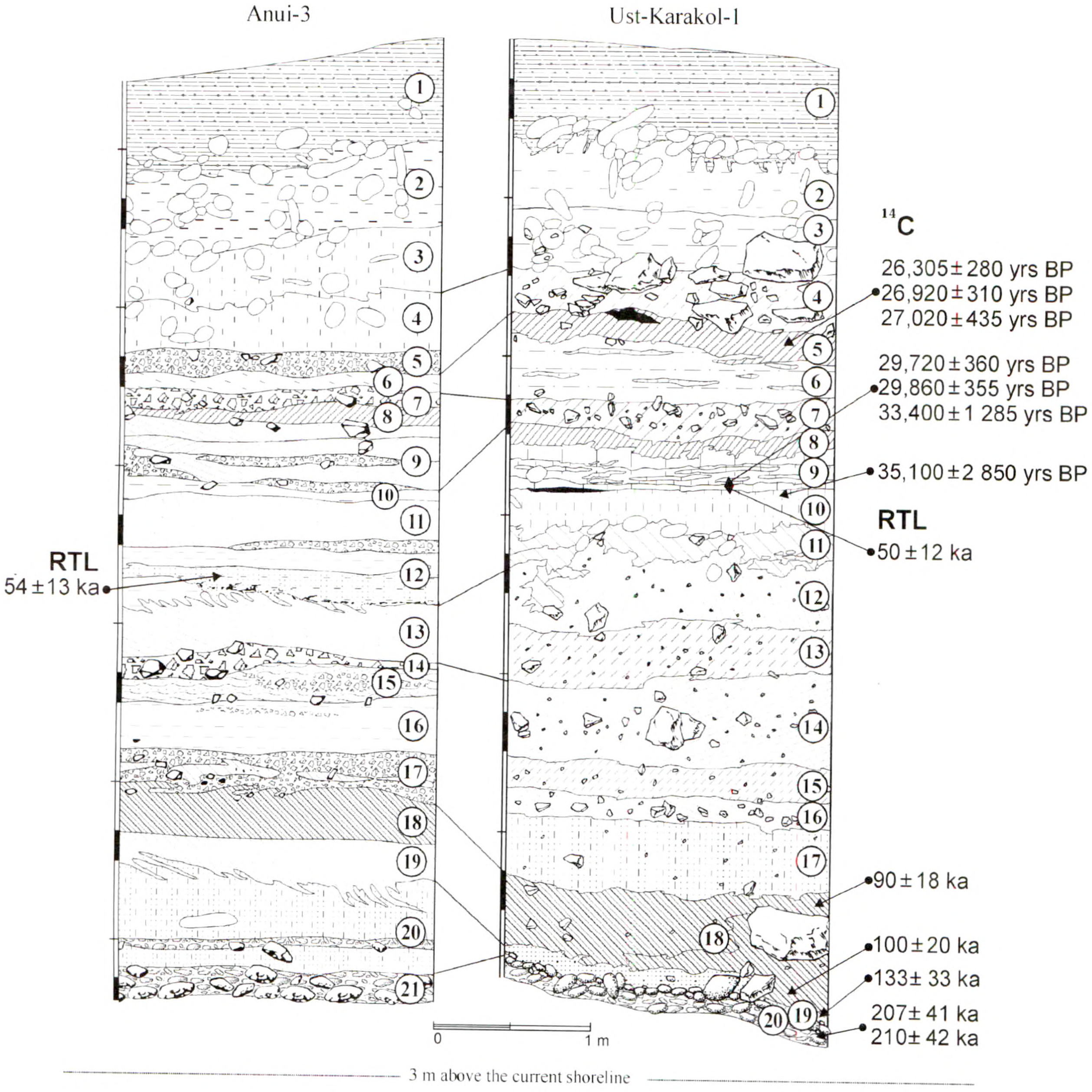

Fig. 6. Correlated stratigraphic columns of the Ust-Karakol-1 and Anui-3 profiles.

The next stage in the sedimentation process is represented by layers of dense laminated loam permeated with gravel; debris laminations together with ferrous stains and developed ferrous-manganese concretions were also noted in strata 17 – 13 at Anui-3. Their lithological features allow attribution to the Ermakovian (W$_1$) period (oxygen isotope stages 5a – b – 4) on the basis of their correlation with strata 17 – 12 at Ust-Karakol-1. Identical brightly colored loam sediments from Anui-3 stratum 13 and Ust-Karakol-1 strata 12 and 13 revealing deformations and lens formations are noteworthy. The bright coloration of the loam, varying from white and light gray to yellowish-red and dark brown hues, is the result of the presence of decomposed limestone (carbonate flour). These features suggest a single unique weathering condition, which has not been noted in the overlying or underlying strata of either profile.

An RTL date of 54 ± 13 ka (RTL-962) was generated on the light-brown loessic loam deposited in the

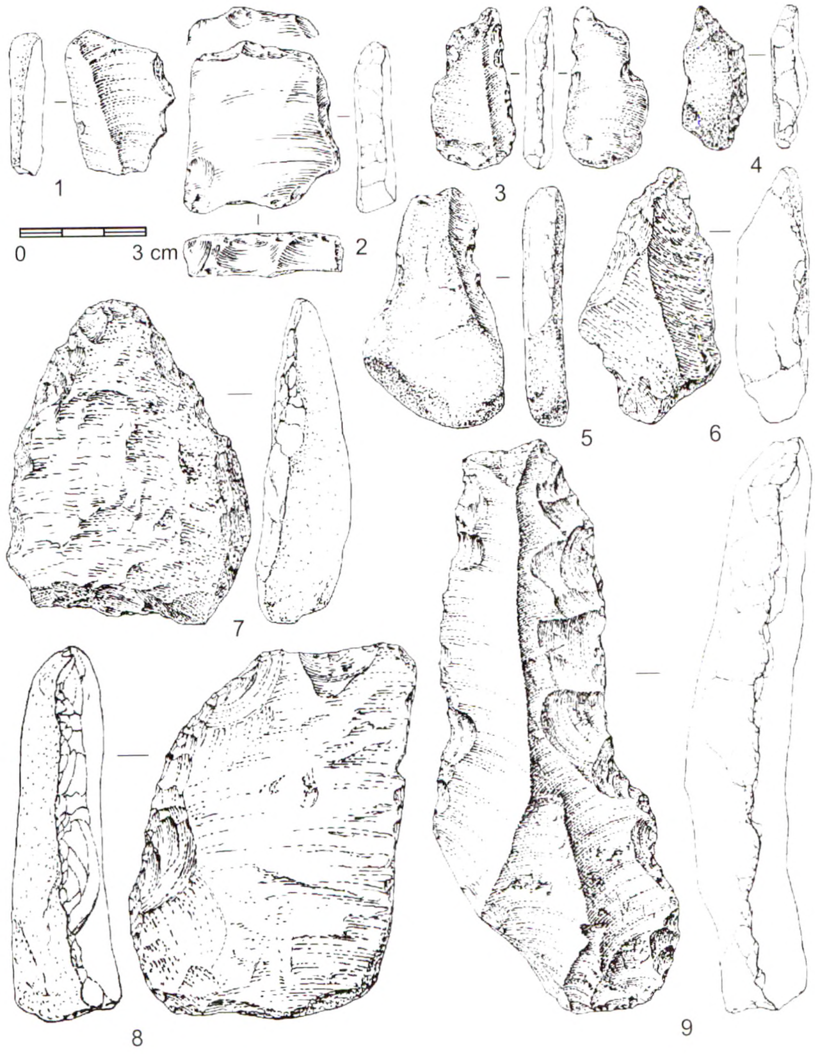

Fig. 7. Early Middle Paleolithic artifacts. Ust-Karakol-1.
1 – denticulate tool; *2* – truncated spall; *3, 4, 6* – spurs; *5* – notched tool; *7 – 9* – *racloirs*.

lowermost portion of Anui-3 stratum 12. In general, the Anui-3 sediments defining the middle portion of the profile (strata 12 – 10) revealed features similar to those noted in strata 11 – 9 at Ust-Karakol-1, especially the occurrence of peculiar S-shaped formations and wedge-shaped deformations. The age of Ust-Karakol-1 strata 11 – 9 has been estimated to fall within the range of 50 – 29 ka.

The overlying lithological unit comprises strata 9 – 5 and represents an intercalation of gravel horizons and dense loam layers with lenses and stains of humic soil. The structural and textural features of these sediments are very similar to those noted at Ust-Karakol-1, strata 8 – 4. Stratum 5 was radiocarbon dated to 27 – 26 ka BP. This date, together with the stratigraphic position of the unit under discussion, substantiates the chronometric attribution of its deposition to the final Karginian (W_{II}, oxygen isotope stage 3) – early Sartan (W_{III}, oxygen isotope stage 2) period.

The uppermost portion of the Anui-3 profile is comprised of strata 4 – 2. These sediments include a loose and medium light-brown loessic loam. The texture and structure of these sediments are analogous to those noted for the Sartanian sediments at Ust-Karakol-1, strata 3 and 2.

Analysis of Paleolithic industries

The Paleolithic industries discussed in the present paper were fashioned on pebbles from the beds of the Anui and Karakol rivers (Derevianko, Kulik, Shunkov, 2000; Kulik, Shunkov, 2000). Mostly pebbles of sedimentary rock were used for tool production, including fine- and medium-grained sandstone, aleurolite-sandstone, and aleurolite. About half of the artifacts were made on paleoeffusive rocks of rhyolitic and dacitic composition. About 10% of the artifacts were produced on hornfels, diabase porphyrite, and vein quartz.

Most early Ust-Karakol-1 artifacts were recovered in the upper portion of the Middle Pleistocene alluvial sediments of stratum 19. A rather small collection of archaeological finds exhibiting heavy surface abrasion was recovered from this layer. The collection comprises *racloirs* with longitudinal (Fig. 7, *8, 9*) and convergent working edges (Fig. 7, *7*), an end-scraper, spur-like tools (Fig. 7, *3, 4, 6*), denticulate (Fig. 7, *1*) and notched (Fig. 7, *5*) tools fashioned with Clactonian and retouched notches, a truncated spall (Fig. 7, *2*), and flakes with discontinuous retouch. In general, these tools appear more archaic in comparison with implements associated with the overlying horizons. On the other hand, the absence of pebble tools and bifacially worked Acheulian-like forms in this collection, as well as the use of parallel flaking in the reduction strategy and the presence of tools fashioned on blanks, support the Mousterian attribution of the whole collection. On the basis of these features and the geological age of the enclosing sediments of stratum 19, these artifacts may be attributed to the early stage of the Middle Paleolithic.

Paleolithic artifacts exhibiting true Middle Paleolithic features were recovered from the Ermakovian lower subaerial deposits of lamellar loam (strata 18 through 13).

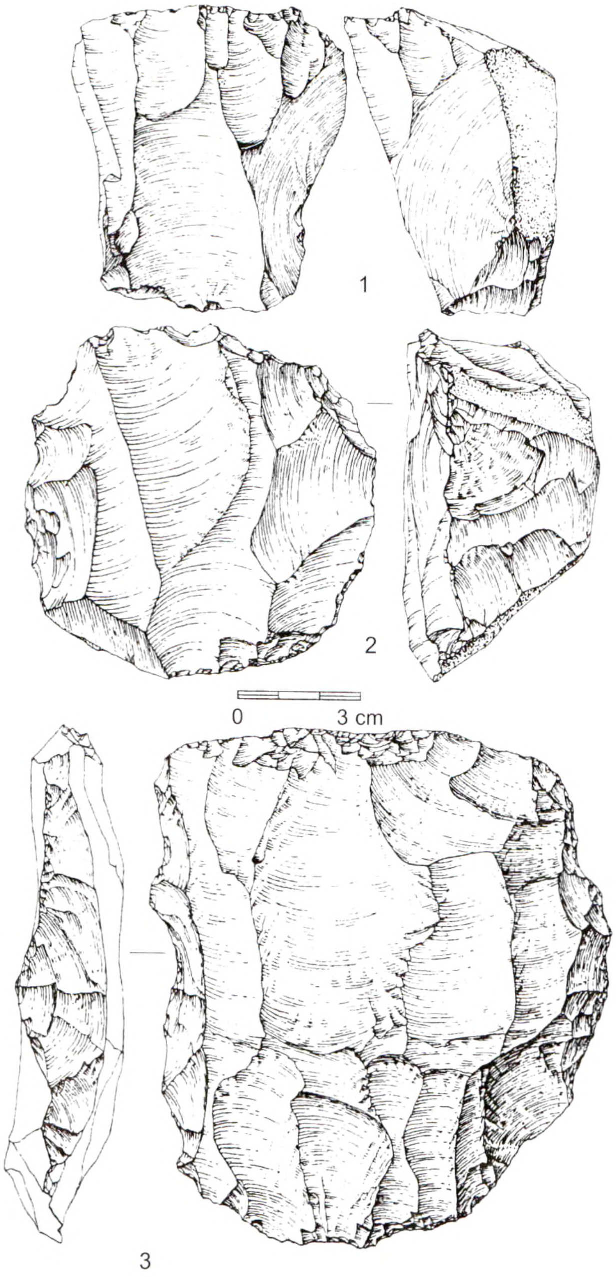

Fig. 8. Middle Paleolithic artifacts. Ust-Karakol-1.
1, 2 – Levallois cores; *3* – parallel (proto-prismatic) core.

Primary reduction within this industry was executed mostly with the recurrent Levallois technique although some implements exhibit the parallel reduction strategy. The Levallois cores include ovoid single platform (Fig. 8, *1*) and rectangular double platform (Fig. 8, *2*) specimens. The parallel cores bear double platforms and one flaking surface (Fig. 8, *3*). Flaking by-products are dominated by spalls with parallel flaking patterns of their dorsal faces. Blanks with rejuvenated striking platforms are comparatively numerous, though in general, the industry may be described as non-faceted. The Levallois blanks constitute slightly more than 10% of the total number of spalls. The proportion of blades reaches one third of the total blanks, testifying to the developed technology of blade production.

The category of instruments for primary stone knapping includes a coarse-grained sandstone pebble, which was apparently used as an anvil, and an elongated ovoid pebble of medium-grained sandstone, presumably used as a hammerstone.

The series of typologically distinct tools is dominated by Levallois implements, including blades (Fig. 9, *4, 6, 8, 9, 11*) and Levallois points without traces of secondary working (Fig. 9, *1* – *3, 7*). The second largest category is notch-denticulate tools. It includes notches (Fig. 9, *5*) and spurred tools (Fig. 9, *12*) fashioned mostly with the aid of Clactonian notches. The Mousterian tool-kit includes longitudinal *racloirs* (Fig. 9, *10*) with straight and convex cutting edges. The angle burins, *grattoirs* with lateral working edges, angle borers, and truncated tools were identified within the series of Upper Paleolithic tools.

The Middle Paleolithic industry includes a series of bifacial implements that are a feature specific to this industry. Noteworthy is a triangular foliate biface made

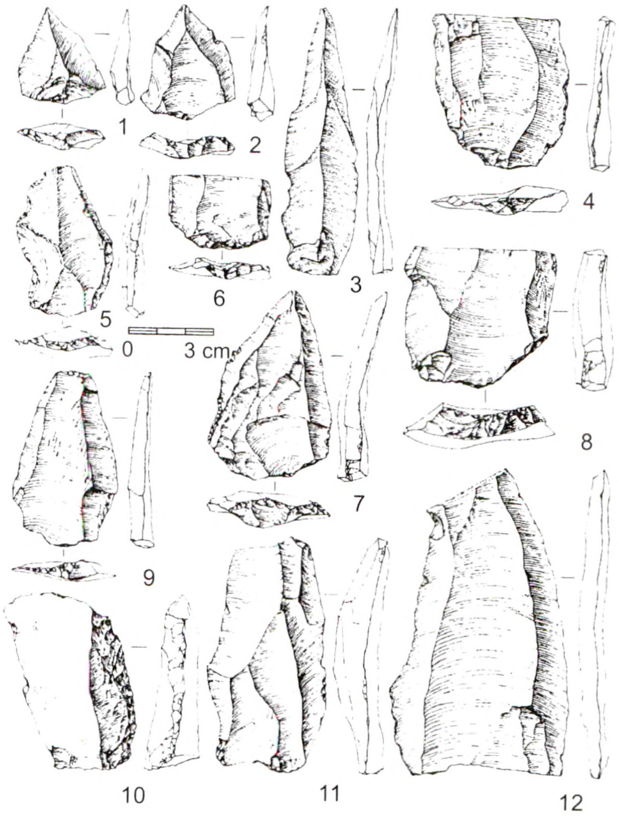

Fig. 9. Middle Paleolithic artifacts. Ust-Karakol-1.
1 – *3, 7* – Levallois points; *4, 6, 8, 9, 11* – Levallois blades;
5 – notched tool; *10* – *racloir*; *12* – beaked tool.

on rhyolitic porphyry (Fig. 10). Both faces of this implement bear negative scars of radially directed wide spalls. Its longitudinal edges exhibit additional treatment in the form of large, sub-parallel retouch. The implement is slightly asymmetric in cross-section; it has a thick base and a flattened working element with convergent cutting edges forming a pointed distal end. Its dimensions are 9.1 × 4.1 × 1.8 cm, allowing its classification as an elongated and flat variety. This biface also has a sinuous working edge and a deep notch in the medial part of the tool on its right side.

Thus, Levallois forms are a specific feature of the Middle Paleolithic industry from the lower portion of the Ust-Karakol-1 profile. The Levallois series includes single and double platform nuclei with one flaking surface bearing negative scars of triangular and laminar detachments as well as points themselves, Levallois blades and flakes, and Levallois spalls modified with retouch and notching. The second characteristic feature of this industry is the presence of parallel cores and bifacial tools in the tool kit, in particular the foliate, bifacially worked point.

The middle portion of the Ust-Karakol-1 profile is composed of loose loessic loam whose age was estimated in the range of 50 – 29 ka ago (strata 11 – 8). This portion has yielded cultural remains of the Initial Upper Paleolithic. This technocomplex is characterized by a reduction strategy aimed mostly at the detachment of parallel elongated blanks from single and double platform cores, including the prismatic variety (Fig. 11, *6, 8*). This artifact collection provides evidence of micro-laminar flaking in the initial stage of the Upper Paleolithic. The collection includes small wedge-shaped (Fig. 11, *3 – 5, 7*) and conical (Fig. 11, *1, 2*) cores from which micro-blades were detached as well as carinated *grattoirs* fashioned with the removal of micro-laminar flakes, and a large series of micro-blades themselves.

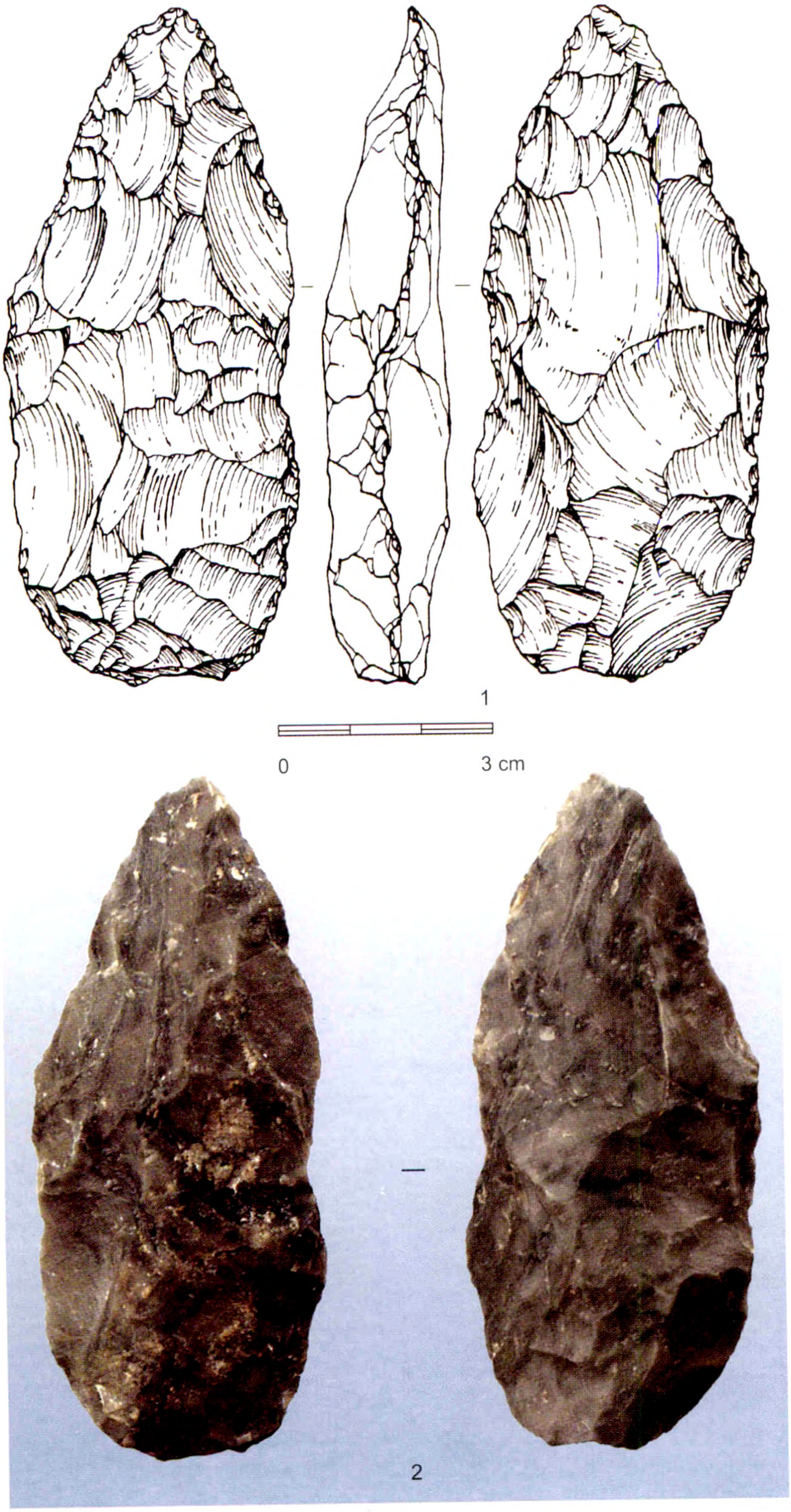

Fig. 10. Foliate biface. Ust-Karakol-1.
1 – drawing; *2* – photo.

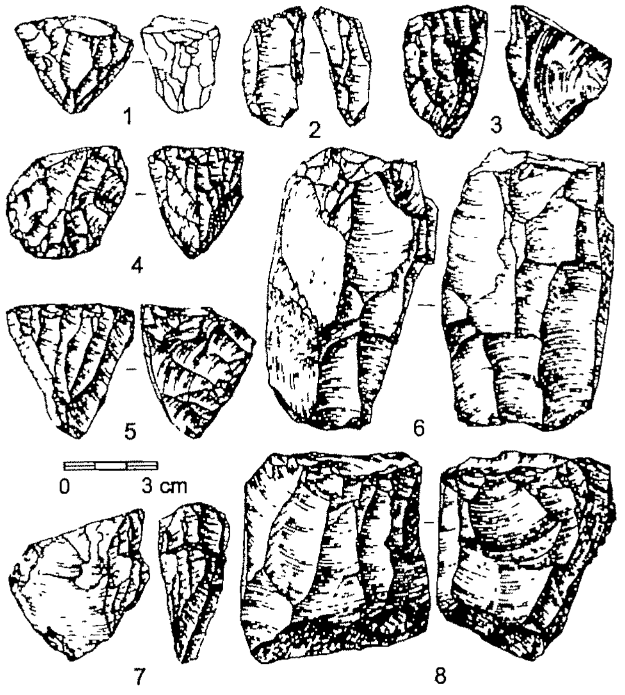

Fig 11 Initial Upper Paleolithic artifacts. Ust-Karakol-1
1, 2 – cone-shaped cores, *3 – 5, 7* – wedge-shaped cores,
6, 8 – prismatic cores

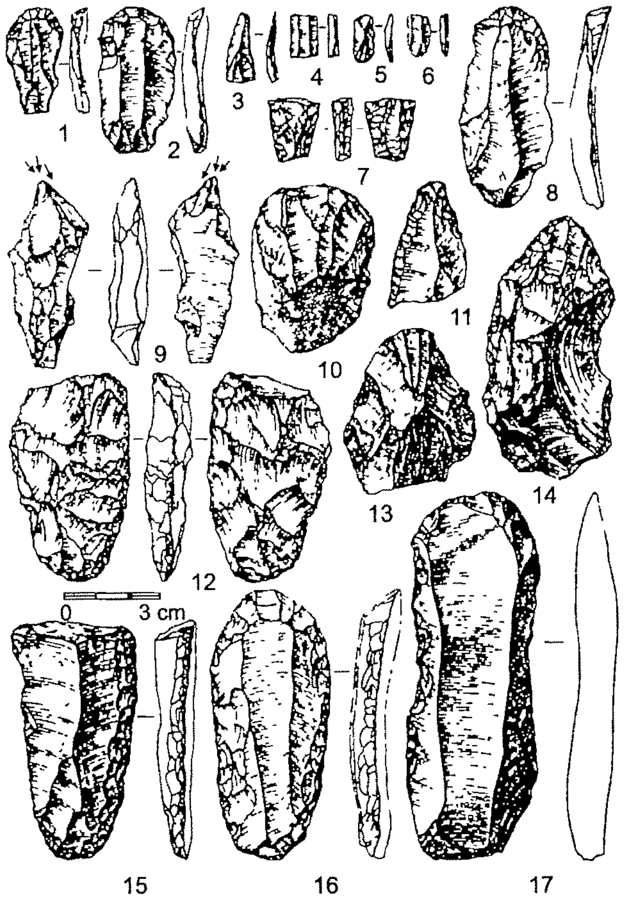

Fig. 12 Initial Upper Paleolithic artifacts Ust-Karakol-1.
1, 2, 8, 11, 16 – end-scrapers, *3 – 6* – backed microblades,
7, 12 – foliate bifaces, *9* – multiple dihedral burin,
10, 13, 14 – carinated *grattoirs*; *15, 17* – retouched blades

The tools for stone knapping include pebbles of aleurolite, gravelite, and medium-grained sandstone, elongated and ovoid, bearing signs of heavy use-wear on their flattened edges and convex surfaces.

Upper Paleolithic tools are most numerous within this lithic collection. The Upper Paleolithic series is dominated by *grattoirs*, burins, borers, and retouched blades. Noteworthy are end-scrapers fashioned on blades (Fig. 12, *1, 2, 8, 11, 16*), and carinated scrapers (Fig. 12, *10, 13, 14*) as well as angular and dihedral (Fig. 12, *9*) burins, large prismatic blades bearing traces of regular retouch on their long edges (Fig. 12, *15, 17*), backed bladelets (Fig. 12, *3 – 6*), and bifacially worked ovoid and foliate tools (Fig. 12, *7, 12*). Other categories identified include longitudinal *racloirs*, intentionally and naturally backed knives, denticulate and spur-like tools, beak-shaped and notched tools fashioned with the help of retouch and notching.

The culture-bearing horizons of the upper portion of the Ust-Karakol-1 profile consisting of a humic loam attributed to the final Karginian episode and loessic sediments of the Sartan chron, yielded relatively small collections of lithic artifacts. On the basis of absolute and relative geochronometric data, these collections are attributed to the middle (stratum 5) and final (strata 4 – 2) stages of the Upper Paleolithic. The major technical parameters of these industries include a parallel pattern of flaking aimed at the production of small and medium-sized elongated blanks from tabular, prismatic, and narrow-face nuclei. The list of tools recovered includes such traditional forms for the Siberian Upper Paleolithic as longitudinal *racloirs* on large spalls (*skreblo*) (Fig. 13, *8*), end-scrapers on flakes (Fig. 13, *6*) and blades, intentionally and naturally backed knives, angle and dihedral (Fig. 13, *7*) burins, angular points and borers, spurs and beaks, flakes exhibiting discontinuous retouch, and retouched blades (Fig. 13, *1, 5*)

Archaeological materials recovered from the nearby Anui-3 site document a developmental trend similar to that noted in the Ust-Karakol-1 tradition. The lowermost portion of the Anui-3 archaeological sequence (strata 19 – 13) produced a rich collection of lithic artifacts, the technical-typological features of which are typical of Middle Paleolithic industries. The Levallois and parallel reduction strategies of flaking single platform cores with one flaking surface (Fig. 14, *4*) served as a technological basis for this industry. Few specimens show radial flaking of cores with two flaking surfaces (Fig. 14, *6*). The

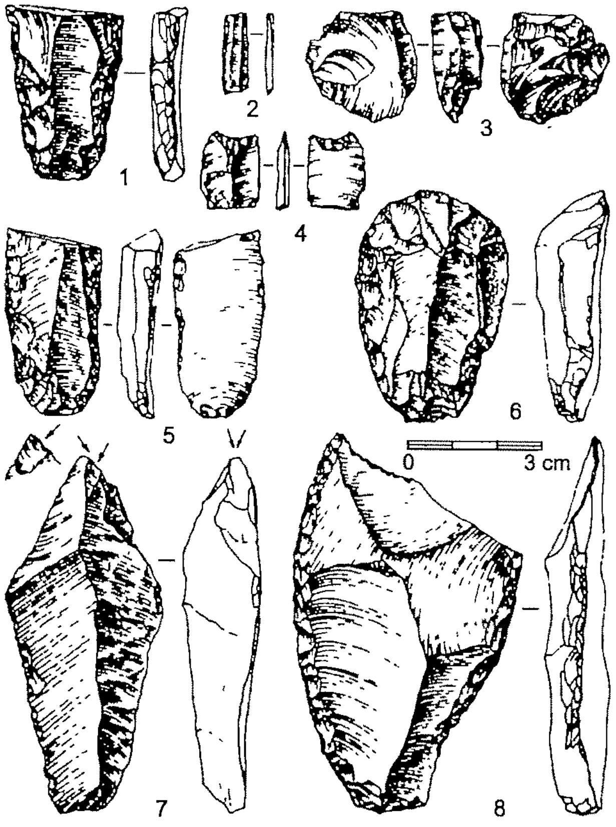

Fig 13. Terminal Upper Paleolithic artifacts Ust-Karakol-1 (*1, 5 – 8*) and Anui-3 (*2 – 4*).
1, 5 – retouched blades, *2* – backed microblade, *3* – wedge-shaped core, *4* – truncated microblade, *6* – end-scraper, *7* – dihedral burin, *8* – *racloir*

majority of spalls may be classified as flakes with parallel patterns of reduction visible on their dorsal faces and plain striking platforms. Few spalls bear rejuvenated striking platforms. Blades constitute about 10% of the total number of blanks recovered.

The most numerous series of tools within this industry is classified as Levallois. It includes points (Fig. 15, *4, 5*), retouched Levallois blades (Fig. 15, *1 –3, 6, 7*), and flakes. This industry is also characterized by a large number of denticulate, notched, and beak-shaped tools fashioned mostly through the production of Clactonian notches. The Mousterian tools include short (see Fig. 14, *2*) and long points (see Fig. 14, *3*) and *racloirs* with longitudinal (see Fig. 14, *1*), diagonal, and transverse (see Fig. 15, *8*) cutting edges The Upper Paleolithic tools include *grattoirs* with lateral working edges, angle and transverse burins, angle borers, and truncation spalls.

The type list of this industry also comprises a series of classically shaped bifacially worked tools recovered in association with stratum 18 including three foliate bifaces with perfectly worked surfaces, an asymmetrical backed biface, and a basal fragment of an ovoid bifacial tool.

The first implement on the list is an amygdaloidal biface made on fine-grained oligomictic sandstone, the only unbroken specimen in this series (Fig. 16). This biface has a sinuous cutting edge, symmetrical cross-section, and a flat-convex profile. It was worked with bifacial reduction; removals were directed from its long lateral sides toward the long axis of the implement. The size of this tool (11.3 × 3.6 × 1.5 cm) allows its classification as a comparatively long and flat specimen. The distal end of the tool is flattened and its convergent cutting edges and sharp tip exhibit additional reduction in the form of abrupt, large- to small-faceted retouch The thick basal part of the implement exhibits scars of intentional stepped removals, suggesting some sort of secondary alteration.

The second tool in this category is a distal fragment of a foliate biface made on rhyolitic porphyry (Fig. 17). This specimen is classic in shape and exhibits perfect secondary working. This fragment has a slightly asymmetrical profile and a sinuous cutting edge with a maximum thickness of no more than 1 cm. The technology required to produce such an implement included detaching large, flat removals in order to flatten

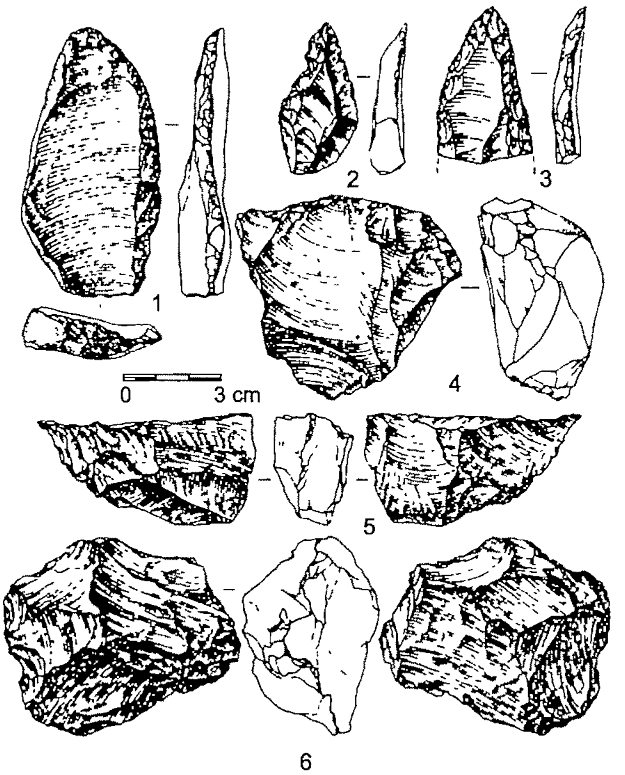

Fig 14 Middle Paleolithic artifacts. Anui-3
1 – *racloir*, *2, 3* – Mousterian points, *4* – parallel (proto-prismatic) core, *5* – bifacial tool fragment, *6* – radial core exhibiting two flaking surfaces

all surfaces. During the second stage of preparation, the tool's straight, convergent cutting edges were sharpened with flat or semi-abrupt, invasive, subparallel retouch.

The morphological features of the large basal fragment of a foliate biface made on a rhyolitic porphyry (Fig. 18) are also interesting. This fragment has a symmetrical, classic shape and its cutting edges are straight and sharp. The dimensions of the fragment (6.0 × 3.4 × 1.2 cm) allow its reconstruction as a long, flat specimen. Both faces were modified with deep radially directed removals; the rounded base was additionally worked with long, flat, thinning detachments.

The largest biface in the series is made on a rhyolitic-dacitic porphyry and is identified as a backed form (Fig 19). The specimen was refitted from three fragments of various sizes. On the basis of its total dimensions (12.3 × 4.6 × 2.1 cm), this tool is classified as an elongated, flat specimen. Both its faces were modified to a flat-convex shape with large radial directed spalls. The slightly convex cutting edge is straight if seen from the side; it was modified along its margin with invasive, abrupt, large-faceted retouch. The massive arched back of the tool interrupts its generally symmetrical form, but still permits its recognition as a classical example of this tool type.

A small fragment exhibiting negative scars of bifacial reduction with radially directed spalls (see Fig. 14, *5*) is also included in this category. This specimen likely represents the thick base of a presumably massive ovoid biface

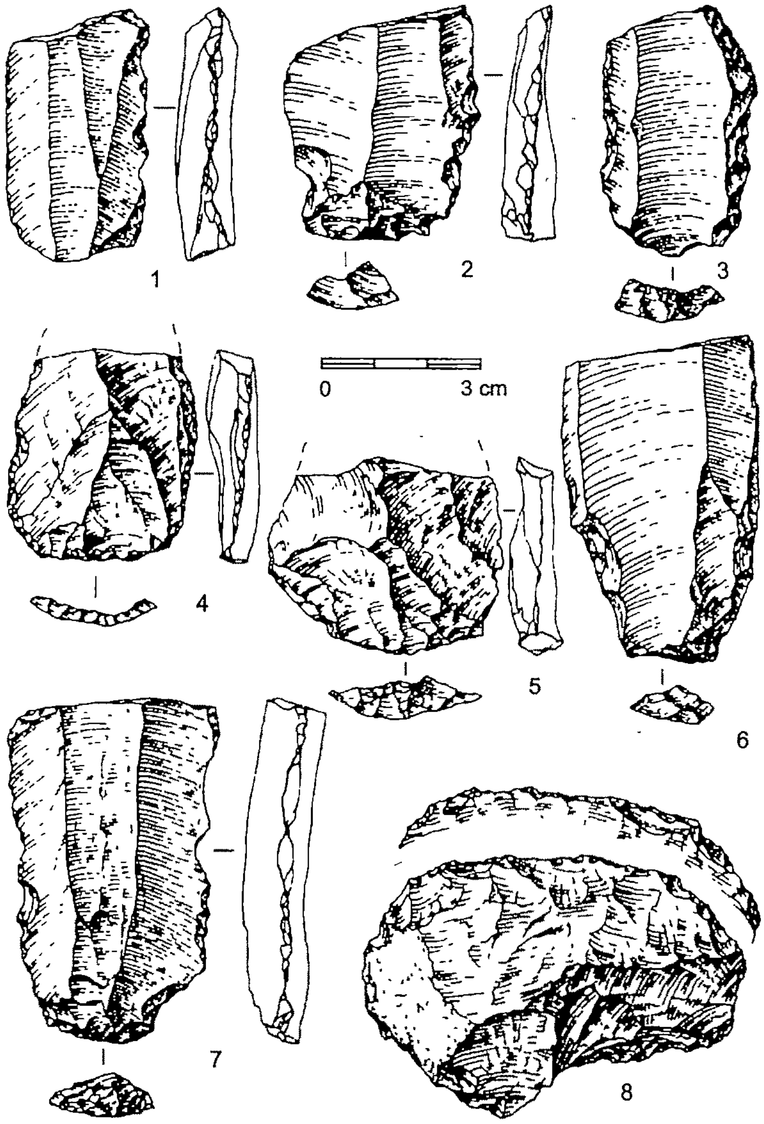

Fig 15. Middle Paleolithic artifacts. Anui-3
1 – 3, 6, 7 – retouched Levallois blades, *4, 5* – Levallois points' fragments; *8 – racloir*

In sum, Levallois forms, most of which are elongated retouched spalls, dominate the Anui-3 Middle Paleolithic industry. However, the typological distinctiveness of this collection rests on the presence of bifacial tools, including perfectly symmetrical foliate bifaces

Archaeological materials recovered from the middle portion of the Anui-3 profile illustrate the next stage in the development of Paleolithic traditions. Lithological strata 12, 11, and 9, containing loose loessic sediments, yielded cultural remains of the Initial Upper Paleolithic. Parallel flaking of prismatic (Fig. 20, *19*) and conical cores characterizes the lithic industry of this cultural-chronometric period. Within the series of elongated spalls (Fig. 20, *15, 20*), micro-blades (Fig. 20, *6, 7*) appear as a new blank type.

Upper Paleolithic tools are diagnostic of this industry. Tools exhibiting signs of secondary working include such morphologically classical types as end-scrapers on flakes (Fig. 20, *9, 10, 13, 16*) and blades (Fig. 20, *14, 18*), carinated *grattoirs* (Fig. 20, *8, 11, 12*), asymmetrical points fashioned on retouched blades (Fig. 20, *17*), and backed micro-blades (Fig. 20, *1 – 5*).

The archaeological collection recovered in association with the uppermost portion of the Anui-3 column (lithological strata 4 – 2) is not particularly extensive, but nonetheless constitutes an integral part of the general development of cultural traditions during the final Pleistocene in Gorny Altai. Intentional micro flaking represents a major technical-typological feature of this industry aimed at recurrent detachment of microblades from cores, including wedge-shaped nuclei (see Fig. 13, *3*). Occurrences of micro-tools within the Anui-3 terminal Upper Paleolithic collection, especially backed microblades (see Fig. 13, *2*) and truncated, retouched microblades (Fig. 13, *4*), attest to the affinities of this industry with the majority of other Altai technocomplexes attributable to the terminal Upper Paleolithic.

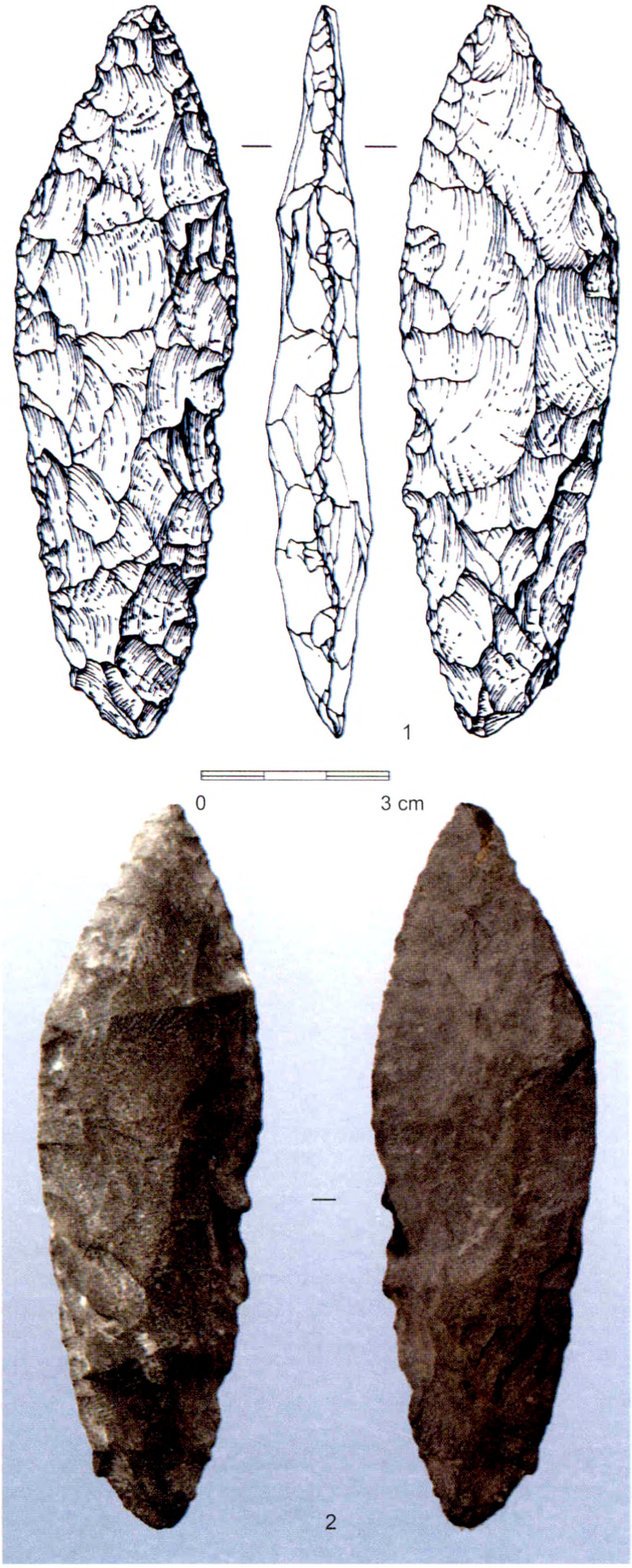

Fig. 16. Foliate biface. Anui-3.
1 – drawing; *2* – photo.

Discussion

Available Paleolithic evidence from the Altai testifies to the fact that the majority of Mousterian sites exhibit common features that evolved within a single Middle Paleolithic culture. However, various Altai technocomplexes reveal different proportions of the major technical-typological indices within this single cultural tradition. On the basis of these variations, two major types of industries have been established in the Altai Paleolithic: industries with predominantly Mousterian technology and those with distinct Levallois implements.

The Mousterian group of industries includes collections recovered from the cave sites of Denisova and Okladnikov as well as from the open-air Tiumechin-1 site, although the artifacts recovered from the latter locality include those bearing features reminiscent of the Levallois-Mousterian trajectory. The primary reduction strategy is predominantly parallel and radial. Levallois reduction is apparent on only a few artifacts, especially within the Tiumechin-1 collection. In general, the impact of the Levallois technique on the technological process seems insignificant. The majority of tools were produced on medium-sized, short spalls. The collection of typologically distinct tools is dominated by Mousterian and notch-denticulate tools. Levalloisian implements are morphologically distinct but scarce. Various *racloirs* including Charentien, diagonal, and *déjeté* varieties, are most numerous. On the basis of the common technical-typological features noted within these materials, we propose categorizing these collections into a "Denisova variant of the Altai Mousterian".

The Altai Middle Paleolithic industries included in the Levallois group possess the most distinct technical-typological features. This group includes the sites of

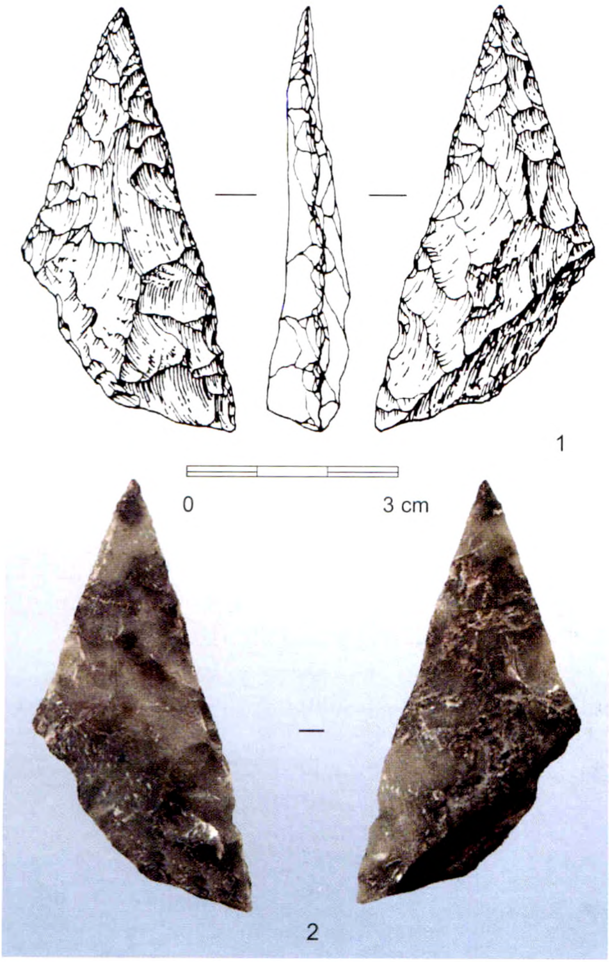

Fig. 17. Foliate biface. Anui-3.
1 – drawing; *2* – photo.

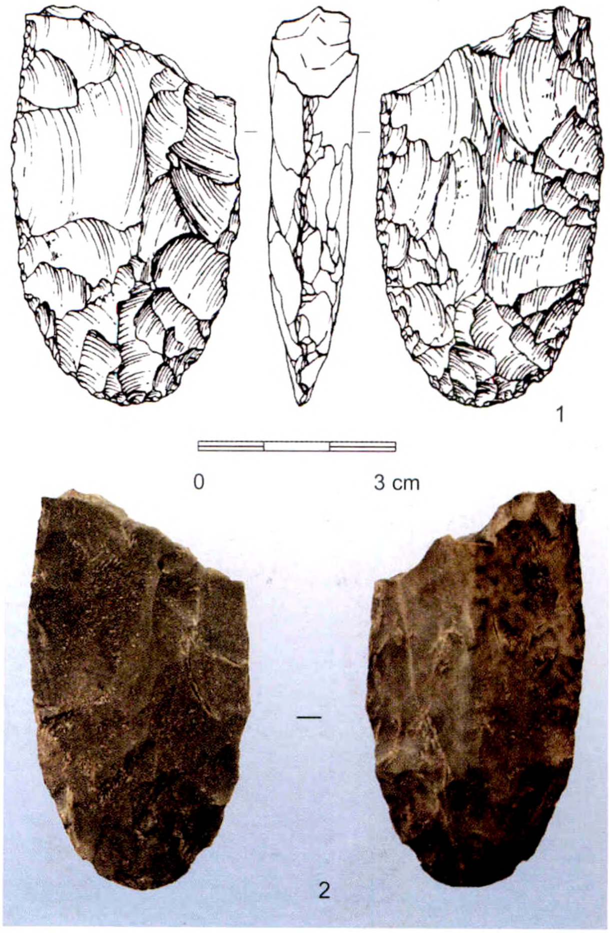

Fig. 18. Foliate biface. Anui-3.
1 – drawing; *2* – photo.

Kara-Bom, Ust-Karakol-1, Anui-3, Ust-Kanskaya Cave, and possibly Strashnaya Cave. These industries are characterized by the predominance of Levallois reduction, a developed technique of blade detachment, comparatively large numbers of tools fashioned on blades and Levallois spalls, a rather small variety of tool types where blades and non-retouched Levallois points are most numerous, and relatively few Mousterian forms. According to these specific characteristics of the Altai Levallois-Mousterian industries, they are designated as the "Kara-Bom variant of the Altai Middle Paleolithic" (Derevianko, Petrin, Rybin, 2000).

The Middle Paleolithic industries from the multilayered sites of Anui-3 and Ust-Karakol-1 demonstrate a well-developed Levallois technology of tool production and bifacial working. Within the Kara-Bom technical variant, materials included in these Levallois-Mousterian collections form a specific industrial type with distinct foliate bifaces.

The foliate biface from Ust-Kanskaya Cave resembles artifacts associated with the above category. It was recovered in the 1950s from the cave in association with Levallois Mousterian implements. This biface exhibits a typical shape and perfect secondary working (Fig. 21). It was fashioned on an elongated laminar spall (10.6 × 2.7 × 1.2 cm) of greenish porphyry and its length is four times greater than its width. This foliate biface has convex surfaces and straight cutting edges. Both surfaces of this implement exhibit negative scars of radially directed, flat, scalar removals, while its working edges and tip show additional treatment with discontinuous, abrupt, sub-parallel retouch.

A foliate biface recovered from the Kara-Bom site is especially noteworthy (Okladnikov, 1983b). This implement was probably redeposited from the Mousterian component of this multilayered site. The biface was made on a massive elongated spall (11.2 × 5.7 × 2.0 cm) of gray quartz porphyry (Fig. 22). Its asymmetrical ovoid contour demonstrates a convex-flat cross-section; both faces show negative scars of radial removals. The longitudinal working edges were additionally modified with large-faceted, abrupt, invasive retouch.

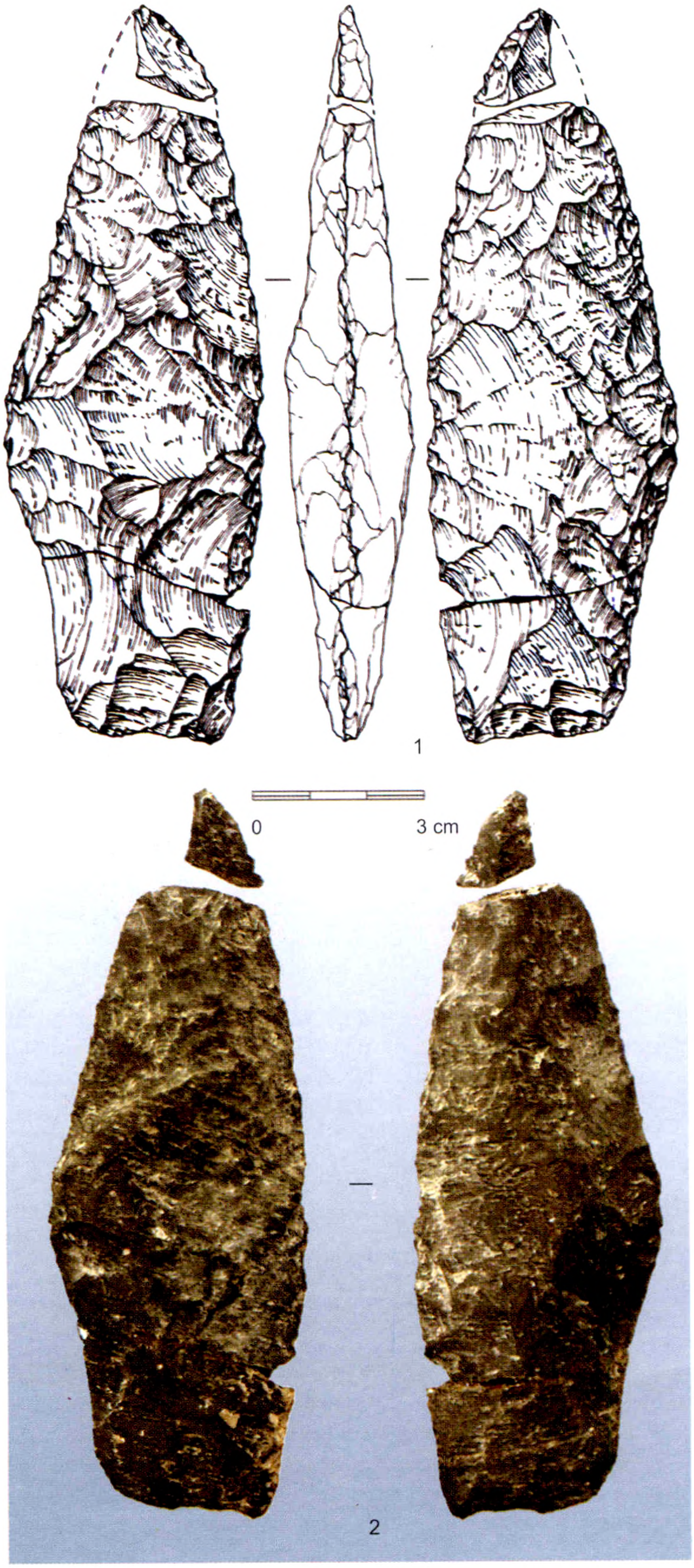

Fig. 19. Foliate biface. Anui-3.
1 – drawing; *2* – photo.

The evidence available has not yet provided reliable grounds for associating the technological variants of the Altai Middle Paleolithic with distinct prehistoric human populations bearing independent cultural traditions. There is also currently insufficient evidence for considering the noted industrial variability of the Altai Middle Paleolithic as a purely chronological phenomenon. The Altai Paleolithic chronostratigraphy testifies to the long-term parallel development of two major industrial variants throughout the so-called "Mousterian Würm" chron. The initial stage of development of true Mousterian industries (e.g., Denisova Cave, stratum 22) is estimated as falling within the Middle Pleistocene, while its final stages (e.g., Okladnikov Cave) are associated with an absolute date of 44 – 33 ka. The age estimates for Ust-Karakol-1 (stratum 18) and Kara-Bom (Mousterian horizon 1) suggest that Levallois-Mousterian industries occurred within the chronometric range of 100 to 44 ka. The current state of our knowledge allows us to hypothesize that differentiation of lithic industries took place within a single Middle Paleolithic culture as the result of various adaptation strategies to different environmental, seasonal, economic, productive, and raw material factors, among others.

The specificity of the productive and economic activities of ancient populations at long-term and seasonal occupation sites may be regarded as one of the reasons for the variability noted in these archaeological assemblages. The pattern of lithic artifact distribution by stratum at the sites of Ust-Karakol-1 and Anui-3 suggests regular, though relatively short-term occupation by human ancestors. On the other hand, the diverse composition of the tool kit does not allow us to regard these sites as merely short-term encampments. Practically all occupation horizons at these sites yielded lithic collections illustrating the entire technological sequence of raw material utilization. Thus, these collections include instruments for primary stone working, principal products of stone reduction, and a typologically diverse tool kit. The noted specificity of the tool kits, correlated with the structure of enclosing sediments, suggests the classification of these multilayered sites as sequences of episodic,

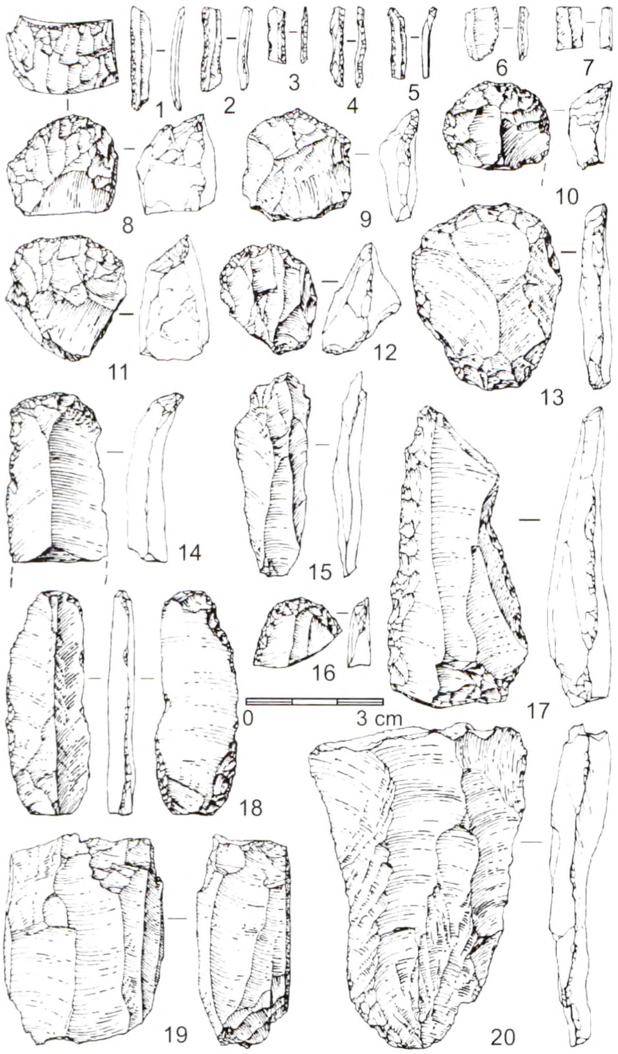

Fig. 20. Initial Upper Paleolithic artifacts. Anui-3.
1 – 5 – backed microblades; *6, 7* – microblades; *8, 11, 12* – carinated *grattoirs*; *9, 10, 13, 14, 16, 18* – end-scrapers; *15, 20* – blades; *17* – point on a retouched blade; *19* – prismatic core.

seasonal occupation sites. This hypothesis is well supported by the topography of Ust-Karakol-1 and Anui-3. Both sites are located in areas of the river valley, which are most beneficial for establishing seasonal hunting camps. The available evidence suggests that these Middle Paleolithic industries were primarily aimed at producing hunting equipment, such as Levallois points and foliate bifaces. Refitting analysis of the lithic artifacts from Ust-Karakol-1 (Postnov, 1999) and petrographic analysis of knapped stone from Anui-3 (Kulik, Shunkov, 2000) indicate that tools were produced at the site rather than having been brought in from elsewhere.

The Mousterian collections associated with long-term occupation cave sites also include bifacially worked tools and classic Levallois implements. However, the

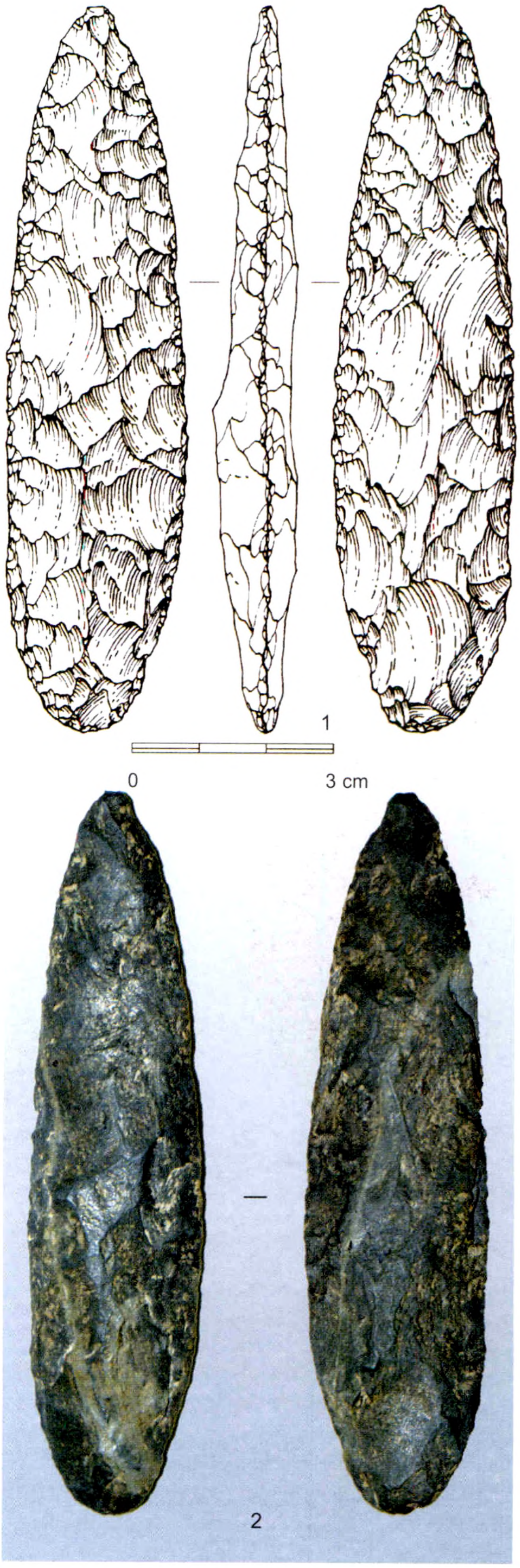

Fig. 21. Foliate biface. Us-Kanskaya Cave (deposited with the State Hermitage in St. Petersburg).
1 – drawing; *2* – photo.

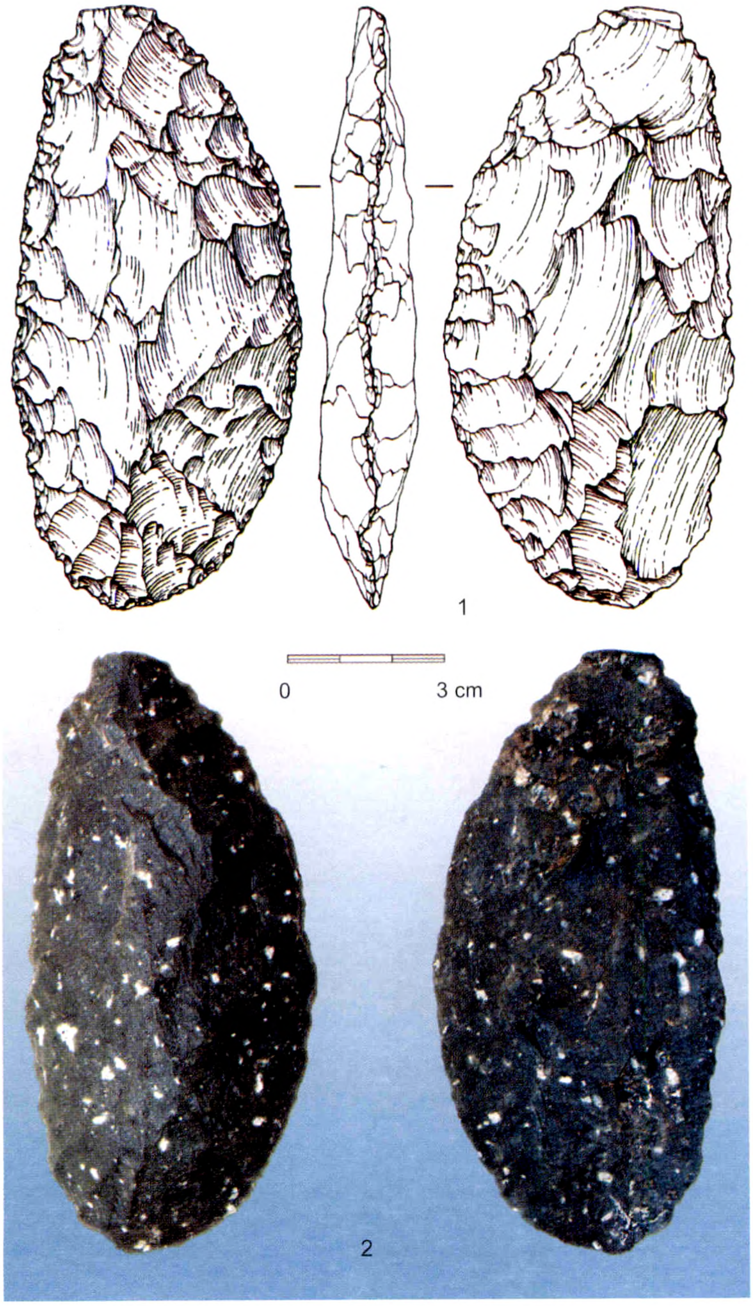

Fig. 22. Foliate biface. Non-stratified part of the Kara-Bom site.
1 - drawing; *2* - photo.

proportion of typologically distinct Levallois tools is two to three times less than that noted in the industries associated with presumed seasonal camps, while foliate bifaces are completely absent in long-term occupation sites. A few specimens recovered from stratum 19 of the Central Chamber (Fig. 23, *2*) and from stratum 10 in the entrance zone (Fig. 23, *3*) at Denisova Cave as well as implements associated with strata 7, 3, and 2 at Okladnikov Cave (Fig. 23, *1*) demonstrate asymmetrical, massive bodies, convex cutting edges, and morphologically non-distinct forms in comparison to the foliate bifaces described above. Generally, bifacial and Levallois traditions in stone reduction are less pronounced in the collections from presumed long-term occupation sites. This may be explained by the fact that solitary, typologically distinct products are not as apparent in the non-homogeneous concentration of waste accumulated at long-term sites. Most likely, distinct technical and typological characteristics dissolved in the homogeneous industrial context of long-term occupation sites.

Currently, no Acheulian-type Lower Paleolithic technocomplexes that might be considered as a basis for the development of Middle Paleolithic industries with bifaces have been discovered in the Altai. Sources for the development of such industries are likely to be discovered in contiguous regions of North and Central Asia. It should be noted that Middle Paleolithic industries with bifaces are mostly based on the Levallois reduction strategy. Consequently, only Acheulian industries exhibiting parallel (proto-prismatic) reduction strategies and Levallois flaking may be considered as candidates for the Lower Paleolithic genesis of their development. Such early technocomplexes with bifaces are characterized by tools produced on strategically planned, shaped spalls detached from well-prepared nuclei. The cultural traditions of parallel and Levallois flaking may have originated in West Asia: in southern Arabia, in the Levant, and in the Caucasus (Hours, 1975; Amirkhanov, 1991; Bar-Yosef, 1994; Liubin, 1998).

Kazakhstan, adjacent to the Altai, has produced the most distinctive Acheulian-like technocomplexes with bifaces from sites located in the northwestern piedmont of the Mugodjari Mountains (Derevianko et al., 2001). The Lower Paleolithic sites of Mugodjari-3 – 6 represent concentrations of heavily to moderately abraded artifacts occurring on the surfaces of diluvial benches and on the crests of hills in the vicinity of quartz sandstone outcrops exploited as the sources of raw material for tool production. These assemblages contain distinct foliate, ovoid, and cordiform bifaces of Acheulian type as well as nuclei exhibiting morphological features of Levallois reduction as well as various *racloirs* and notch-denticulate tools.

Artifacts identified as true Acheulian bifaces have also been reported from other regions of Kazakhstan, including sites on the Mangyshlak Peninsula (Medoyev, 1982); the Bale localities and Semizbugu, Locus 2 in the northern Lake Balkhash area (Medoyev, 1970; Derevianko et al., 1993); Zhaman-Aibat-4 and Vishnevka-3 in the southwestern and northeastern parts of the Kazakh hummocky topographic area (Klapchuk, 1976; Voloshin, 1988), and Kudaikol in the western middle Irtysh Basin, near Pavlodar (Medoyev, 1968). These collections include various types of bifacial tools together with Levallois reduction products, various *racloirs*, and notch-denticulate tools.

Archaeological materials recovered from the Koshkurgan-1 site, located in the southwestern Karatau Mountain range (Derevianko et al., 2000d), define a peculiar type of Upper Paleolithic industry. Lithic artifacts were recovered from a stratified context deposited in association with animal bones of the Koshkurgan (Tyraspol, Q_I) faunal complex in subaquatic travertine sediments. The age of the Lower Pleistocene fauna has been estimated by ESR as falling within the range of 400 – 500 thousand years ago. Archaeological materials recovered have been classified as a microlithic pebble industry, which is to say that the tools were mostly made on small pebbles (average size 4 to 5 cm) derived from various rocks. Levallois and single platform cores, short, non-faceted spalls, single longitudinal and double *racloirs*, and notch-denticulate tools represent the most numerous categories within the Koshkurgan-1 lithic collection.

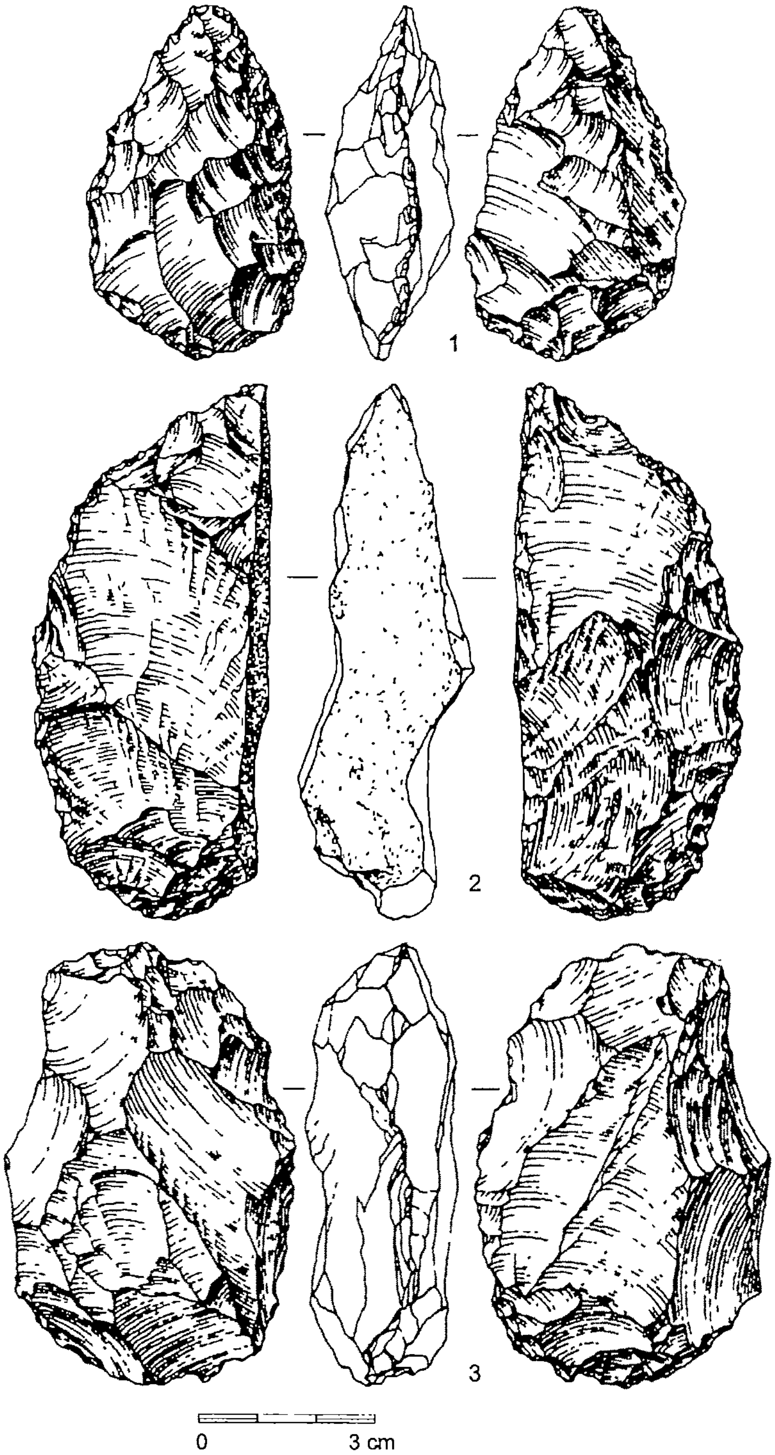

Fig 23. Bifacial specimens Okladnikov (*1*) and Denisova (*2, 3*) caves

Borykazgan, Tanirkazgan, and Akkol, among other sites located in the northeastern foothills of the Karatau Mountains, have yielded archaeological collections representing another variant of Kazakhstan's earliest industries (Alpysbayev, 1979). The following characteristics are regarded as diagnostic of these industries: amorphous pebble cores, large choppers and chopping tools, and a few tools fashioned on flakes. On the other hand, proto-Levallois features (Liubin, 1970) and elements of the Levallois technique (Medoyev, 1982) are also identified at these sites.

In Mongolia, Acheulian-like bifaces were first reported within the surface collections at such open-air sites as Bottom-of-the-Gobi and in the vicinity of Mount

Yarkh (Okladnikov, 1983a, 1986). Amygdaloidal, ovoid, and sub-triangular bifaces together with discoidal, proto-Levallois, and Levallois cores comprise the earliest component of these diachronic surface collections.

Recent investigations in the southeastern Gobi Altai have provided new information supporting a model of the dissemination of Acheulian elements over Mongolia in the Paleolithic. Bifacially worked tools associated with Levallois products have been identified within the series of artifacts exhibiting moderate surficial aeolian abrasion at Tsakhiurtyn Hondii or "Flint Valley" (Derevianko et al., 1996), in the Trans-Altai Gobi (Derevianko et al., 2000b), as well as from collections associated with the lower stratigraphic levels in Tsagaan Agui Cave (Derevianko et al., 2000a) and from a workshop locality in the vicinity of the cave (Derevianko et al., 2000c). Age estimates for the Tsagaan Agui sediments suggest an Early Pleistocene origin for the local Levallois-Acheulian traditions.

The majority of the Mongolian Lower Paleolithic industries bears features characteristic of pebble tool traditions (Kamennyi vek..., 1990, 2000). Numerous sites located in the northern part of the Valley of Lakes (Nuuruudin Hondii) and in the Mongolian Altai have yielded rich collections of aeolian abraded artifacts including large multiplatform, orthogonal (polyhedral) cores, Levallois and parallel nuclei with one flaking surface, "citron" spalls, various types of *racloirs*, notch-deniculate tools, and choppers. Nearly all the early industries of Mongolia exhibit Levallois technical methods in stone reduction.

The Torgalyk A Lower Paleolithic site located in the Tuva has yielded Acheulian artifacts (Astakhov, 1990, 1998). This site is the nearest to the Altai Lower Paleolithic sites discovered so far in South Siberia. Its geo-morphological setting and the heavily aeolized state of the artifacts' surfaces allow age estimates of no later than the Middle Pleistocene. Among other heavily abraded artifacts, cores exhibiting elements of Levallois reduction, longitudinal *racloirs*, massive points and *grattoirs*, notched and denticulate tools have also been identified The collection also includes archaic bifaces in a variety of forms including *limandes* and proto-*limandes* as well as amygdaloidal and ovoid bifaces.

Bifacial stone reduction strategy has been also recorded at the Lower Paleolithic sites of the southern Angara region. Heavily abraded artifacts made on quartzite have been found exposed on high terrace surfaces on the right bank of the Angara and on the technogenic banks of the Angara Dam. Also such finds have been reported from redeposited contexts in the lowermost portion of the Muruktinsky (W_I) sediments (Medvedev, 1983; Medvedev, Vorobieva, 1998). Judging by the relative stratigraphic position of these artifacts and the state of aeolian abrasion apparent on their surfaces, they cannot be younger than the Tazovski (R_{III}) episode. The collection of archaic quartzite tools includes ovoid cores exhibiting radial flaking, Levallois cores with fan-like and parallel flaking patterns, longitudinal, transverse, and *déjeté racloirs*, points and *grattoirs* on massive flakes, and so-called chopper/chopping tools with straight and triangular cutting edges. All southern Angara lithic collections may be subdivided into one of two traditions. Tarakhaiski and Olonski. The Tarakhaiski group comprises industries with well-developed pebble tool technology. Primary reduction is based on the "citron" flaking strategy and chopper/chopping tools constitute a considerable proportion of the tool kit. The Olonski assemblages are more similar to Acheulian-type industries. This variant is characterized by bifacially radially flaked core-like implements and specific quartzite micro-bifaces as well as by occasional pebble tools.

Eastwards, bifaces reminiscent of western Acheulian specimens have been reported from the territory limited within North China* Solitary Middle Pleistocene bifacially worked tools classified as handaxes (e.g., the Gongwangling locality at Lantian, Shanxi and Kehe, Shanxi) and a cleaver (Zhoukoudian, Locality 13) were recovered from the loess plateau and Huanghe Basin (Chardin, 1935; Pei Wenzhong, 1937; Yi Seonbok, Clark, 1983; Jia Lanpo, Huang Weiwen, 1991). However, reliable evidence illustrating Levallois technology in Paleolithic industries has not yet been reported from China (Gao Xing, 2000). The notable absence of developed, standard Levallois technologies in East Asian industries (Abramova, 1984; Ranov, 1999) serves as a major argument supporting the hypothetical western origin of the technical and typological basis of the Lower Paleolithic in Central Asia.

In summary, this brief review of known Lower Paleolithic technocomplexes reported from those regions geographically contiguous with the Altai has shown that the majority of industries producing Acheulian-like bifaces are characterized by developed methods of parallel and Levallois reduction and, consequently, by the production of tools on intentional blanks of standard size. The features noted support our hypothesis regarding the original development of the Altai Middle Paleolithic, including Levallois-Mousterian industries with bifaces, on the basis of local Lower Paleolithic cultural traditions bearing the Levallois reduction strategy.

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* The bifaces from Chon'gokni, South Korea, whose age has been provisionally estimated as Late Pleistocene (Yi Seonbok, 1992) are not referred to in the present paper nor are the bifaces from the Bose Basin, South China (Hou Yamei et al , 2000, Comparative Studies . , 2001), which fall within the geographical range of the Southeast Asian Lower Paleolithic

Conclusions

The Levallois tradition of stone reduction has been shown to be characterized by continuous progressive development in North and Central Asia during the Middle Paleolithic. On the contrary, available archaeological materials have not produced evidence of a widespread distribution of Acheulian-like technology, including bifacial treatment. Among the dozens of Middle Paleolithic sites that have been discovered in this territory, only Kulbulak as well as the Altai technocomplexes discussed above have produced indisputable foliate bifaces. The stratified Kulbulak site is located in the northwestern Tien Shan range (Kasymov, 1972; Kasymov et al., 1985). The stratigraphic column at this site yielded at least twenty-four Mousterian levels. It is also possible that the majority of cultural horizons identified in the lowermost portion of the profile are attributable to the Middle Paleolithic as well since there is no evidence so far of their earlier, Acheulian, antiquity. Cores exhibiting radial and parallel reduction patterns dominate the archaeological collections associated with indisputable Mousterian horizons. The associated tools were mostly made on short, massive spalls due to the scarcity of blades and Levallois flakes of good quality. Bifacially worked tools, including foliate bifaces as well as a considerable number of tools exhibiting notching and serration, represent major characteristic features of this collection, unlike other industries recorded in this region.

The Kulbulak archaeological materials form a specific industrial variant within the range of Central Asian Paleolithic collections. Also, the Kara-Bura site has yielded an archaeological assemblage that includes an unusually large number of pebble tools, allowing its classification as a separate "Mousterian-Soanian variant". Other Mousterian technocomplexes identified in this region may be classified in the same ways that Gorny Altai industries are into two major technical variants: the true Mousterian (or Montane Mousterian) and the Levallois-Mousterian (Ranov, Nesmeianov, 1973).

The major technical features of the Central Asian Levallois-Mousterian industries, such as those from Obi-Rakhmat, Khodjakent, and Khudji, include the parallel reduction strategy for cores with prepared platforms and large numbers of laminar blanks and tools fashioned on large blades. Similar features are also characteristic of the Kara-Bom variant of the Gorny Altai Middle Paleolithic. Predominantly radial and parallel cores, a small number of blades, and a typologically diverse series of *racloirs* typify the industries associated with long-term occupation cave sites like Teshik-Tash and Ogzi-Kichik. Such technical features are also noted within those industries included in the Denisova variant of the Altai Mousterian

Previously identified variants of the Altai Middle Paleolithic also show features analogous with Paleolithic industries recorded in the Eastern Mediterranean. For instance, Levallois Mousterian archaeological materials of the Kara-Bom type resemble the Tabun D Early Mousterian assemblages from the Levant (Bar-Yosef, Meignen, 1992; Marks, 1992). The high level of development of Levallois technology focused on parallel flaking aimed at producing elongated spalls, including large blades and Levallois points, is the major characteristic feature shared by these industries. The resemblance of the Mousterian materials recovered from Okladnikov Cave in the Altai to the Yabrudian complexes recovered from Tabun Cave, Yabrud I rockshelter, and other Paleolithic sites in the Levant is also noteworthy (Rust, 1950; Jelinek, 1981, 1982). These industries include many similar tool types, especially the numerous *déjeté* scrapers.

The analogous technical-typological features noted in the Middle Paleolithic technocomplexes of the Altai, Central Asia, and Near East suggest their attribution to a single cultural domain. In this respect, western Central Asian sites seem to provide links between Middle Eastern and Central Asian industries. On the other hand, western Central Asian sites could hardly have been centers from which Mousterian traditions were transmitted eastward (Ranov, 1990; Ranov, Laukhin, 2000), because the Altai Middle Paleolithic technocomplexes are at least two or even three-times earlier than Mousterian sites currently reported from western Central Asia.

Mousterian traditions dispersed over Asia to include the territory of Mongolia. The available materials provide evidence for similar tendencies in the formation and development of Middle Paleolithic industries. Thus, the Mousterian industry identified in the important cave site of Tsagaan Agui (Derevianko et al , 2000b) is characterized by parallel reduction of Levallois, proto-prismatic, and narrow-fsace nuclei. Massive *racloirs*, notch-denticulate, and spurred tools represent major tool categories within the Tsagaan Agui tool kit. Similar technical and typological features were noted within the collection of moderately abraded artifacts assembled at Khoit-Tsenker-Gol-2 in the Mongolian Altai (Kamennyi vek .., 1990). In Gorny Altai, the industries included in the Denisova variant of the Middle Paleolithic represent the closest analogue with Mongolian materials. The alternative variant of the Mongolian Middle Paleolithic is represented by Levallois industries. The Barlagiin-Gol-1 site (specifically, the series of moderately abraded artifacts) located in the southeastern Mongolian Altai (Derevianko, Petrin, 1987) and the Orkhon-1 stratified site located in the southern Hangayn Mountains (Petrin, 1991) yielded archaeological collections which demonstrated high indices of Levallois technique utilization in tool production. Levallois tools, including cores, points, blades, and flakes, represent the most numerous categories in these tool kits. The Orkhon-1 archaeological materials indicate the contemporaneous existence of Levallois and Mousterian industries in the Mongolian Paleolithic. The Levallois technocomplexes of Mongolia particularly resemble the Kara-Bom variant of the Altai Middle Paleolithic. It has been noted that both technical traditions evolved within the Mongolian Paleolithic. Both developmental trends are illustrated in the available archaeological materials attributable to the transitional period from the final Middle to the Initial Upper Paleolithic. The true Mousterian variant is illustrated by the archaeological collection associated with deposits from the third sedimentation cycle in Tsagaan Agui Cave, while the Levallois-Mousterian variant has been identified in materials recovered from the Orok-Nuur-1 and 2 sites, located in the northern Valley of Lakes or Nuuruudin Hondii (Kamenny vek..., 2000).

The cultural continuity apparent in the development of the Mongolian Paleolithic suggests the formation of Mousterian traits on the basis of a local Lower Paleolithic tradition with Levallois technology. The analogous features of the major Mousterian variants allow us to include Mongolia, primarily the Mongolian and Gobi Altai regions, and Gorny Altai in a single geographical unit representing the development of a distinctive Middle Paleolithic culture.

Around 50 to 40 thousand years ago, Initial Upper Paleolithic industries were formed as a result of the continuous transformation of Middle Paleolithic industries in the Altai. The Altai Upper Paleolithic technocomplexes exhibit certain features in common. However, each assemblage possesses its own specific characteristics, on the basis of which the whole body of Altai Initial Upper Paleolithic industries may be subdivided into two major groups reflecting a particular developmental trend: the Ust-Karakol and Kara-Bom trajectories (Derevianko, 2001).

Such Altai technocomplexes as Ust-Karakol-1, Denisova Cave, Anui-3, Tiumechin-4, and possibly, Strashanaya Cave are included in the Ust-Karakol variant. This variant is characterized by parallel reduction of Levallois and single platform cores as well as by the addition of new methods aimed at repetitive detachment of elongated blanks from prismatic, conical, and narrow-face cores, including wedge-shaped varieties. As a result of the application of this progressive technology, the technique of microblade flaking developed, aimed at the production of microblades themselves and at fashioning specific Upper Paleolithic tool forms. The tool kits identified within these industries still include numerous *racloirs* (mostly longitudinal varieties) and notch-denticulate tools. Levallois implements are rather scarce. The Upper Paleolithic tools constitute several new types that have not been noted in earlier collections. Most interesting are so-called Aurignacian forms including end-scrapers on blades, carinated scrapers fashioned with micro-laminar removals, dihedral burins (including a multifaceted variety), large blades retouched throughout their whole perimeters, and backed microblades. Bifacially worked tools, especially classical foliate bifaces, constitute an important characteristic feature of these assemblages. The Tiumechin-4 site produced the largest collection of such bifaces. Another important feature is the occurrence of various bone implements recovered in Denisova Cave stratum 11. The bone tool collection includes eyed needles, piercers, cylindrical beads with annular incisions, bead blanks, a ring fragment made of mammoth tusk, and pendants made of various animal teeth. This bone implement collection from Denisova Cave is the earliest thus far recorded in the Paleolithic of North and Central Asia.

The lithic industries from Kara-Bom, Kara-Tenesh, and possibly Maloyalomansky Cave represent the Kara-Bom variant of the Upper Paleolithic. The laminar technique is most pronounced in the technological processes of these industries. Most cores exhibit parallel flaking patterns suggesting the production of elongated spalls. The Levallois technique is still apparent; however, certain new technical methods began to be employed, in particular microlaminar flaking of cores including narrow-face varieties. Large blades were the principal intended product, as most of the tools are fashioned on such blanks. Notch-denticulate tools are still numerous in the collection, although Upper Paleolithic tools fashioned mostly on large blade blanks dominate the tool kit. The following Upper Paleolithic categories have been identified: end-scrapers, dihedral burins, knives with retouched backs, long points with flattened ventral faces, and blades showing retouch along their longitudinal margins. Certain so-called "Aurignacian" elements were also noted within these collections, as well as scarce bifaces and objects of adornment made from animal teeth. However, such artifacts are scarce and do not form a discernible stable technical-typological series. Repetitive production of large blades and blade-based tools represents the principal technological feature of the Kara-Bom tradition.

Two technological trends in the development of the Altai Upper Paleolithic have been identified on the basis of excavated technocomplexes attributable to the Initial Upper Paleolithic. These trends may be extrapolated over a broader area of North and East Asia because of the crucial geographical and chronological position of the Altai. The Kara-Bom tradition was responsible for the dissemination of blade-based industries over this territory. The Ust-Karakol technical variant stimulated the development of industries based on a narrow-face reduction strategy, micro-flaking technology, and the production of foliate bifaces

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ON THE ISSUES OF THE MIDDLE TO UPPER PALEOLITHIC TRANSITION

Introduction

The paper *The Transition from the Middle to Upper Paleolithic in North Eurasia* by two outstanding European experts in Paleolithic studies, M. Otte and J K. Kozlowski, is dedicated to one of the crucial issues in this field of knowledge and has generated considerable interest. Our special interest has been raised by the fact that this problem is discussed on the basis of archaeological evidence obtained from a vast region. Investigated archaeological sites have been irregularly dispersed over the territory of North Eurasia, where the areas of high concentration of Middle and Upper Paleolithic sites adjoin the regions that have not been properly investigated. This fact has launched a considerable debate.

Both researchers are definitely sure that the non-critical adaptation of European transition classification to materials originating from elsewhere, especially from Asia, does not suit the attempts to identify local transitional industries. The Asian Paleolithic industries have demonstrated an astonishing diversity greatly differing from analogous European lithic assemblages. This fact had been initially highlighted by F. Bordes, who described the Paleolithic of China 45 years ago. He wrote that the specific Upper Paleolithic technocomplex of Zhoukoudian resembled only ultimately the known West European Upper Paleolithic industries (Bordes, 1958).

Examples illustrating specificity of Asian Paleolithic industries

The Shonvinien Culture of Vietnam, which is penecontemporaneous to the European Upper Paleolithic period, has yielded abundant pebble tools of various types (Nguyen Khak Shi, 1982) and quite specific stone reduction strategies. During my stay in Vietnam in 1984 – 1985, I had the opportunity to study the materials of this culture. For instance, I examined the lithic collection recovered from the Nam Tun Cave (dating from more than 15 ka ago) through Bordes's method and generated the following technical indices: IL = 0.5, IF = 2 5; I_{lam} = 5.0; ICl (Clactonian) = 73.0; the natural platform index was equal to 90.8. Such indices did not correlate to any known European complexes of the Middle Paleolithic, and even less so with the Upper Paleolithic technocomplexes. Of the total series of 156 specimens, 128 items represented pebble tools, while the categories typical for the Upper Paleolithic were comprised of two *grattoirs* fashioned on flakes. Similar features were noted for two other collections, one of which, the Xom Trai collection, was attributed to the Haobinhien Culture correlated with the European industries of the Final Paleolithic and Mesolithic. On the contrary, the Stone Age assemblage recovered from the lower level of Nguom rockshelter (which was overlaid by the strata bearing material cultural remains of the Haobinhien and Shonvinien cultures; a ^{14}C date of more than 30 ka was generated for the sterile layer immediately overlying the lower culture-bearing level) may be identified as a specific sort of Denticulate Mousterian with abundant pebble tools. The major characteristic feature of this technocomplex was the apparent predominance of tools made on flakes including a few Levallois forms and blades. The noted tendency of industrial evolution towards specialization is unusual for the European Paleolithic, as the more profound (but earlier) Middle Paleolithic technology was substituted for the more archaic one. Evidence of such sort may originate from other sites in the vast Asian continent, which have not been investigated properly yet. The adherents of absolute application of the European classification to the Asian materials should definitely consider this fact.

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Examples illustrating specificity of European Paleolithic industries

I fully agree with the authors of the above-mentioned paper that the Upper Paleolithic culture could have been formed as the result of not only interference of the Middle Paleolithic and Aurignacian cultural traditions, but also in the course of the European Mousterian evolution. Such an inference seems very important as it implies a multiformity of the transition from the Mousterian to the Upper Paleolithic. On the other hand, precautions should be taken in order not to reanimate the old-fashioned point of view that the Aurignacian Culture was brought to Europe by the anatomically advanced humans This later hypothesis contradicts the noted diversity within that array of industries, which are generally referred to as "Aurignacian", though they demonstrate considerable difference from the true Arignacian in France. This fact was stressed by some Russian researchers (Grigoriev, 1972). L.B. Vishniatski (2000) discussed this topic specifically. He argued that all the known early Aurignacian sites in Europe are dated from the later period in comparison to such transitional industries as Szeletian, Bohunician, and Châtelperronian. However, if the examination of an industry is mostly reduced to the identification of the so-called "Aurignacian *grattoirs*", and such important features as blades bearing Aurignacian type of retouch are ignored, then the widest dispersal of "Aurignacian" culture can be guaranteed.

Also, such an "Aurignacian" technocomplex containing leaf-shaped bifaces has been identified in the southwestern part of the Russian Plain. The technocomplex is based on the Stinkian Middle Paleolithic industry. Such links between the local Upper and Middle Paleolithic industries have been suggested by various authors dealing with the origin of regional Upper Paleolithic cultures (Borziac, 1978, Amirkhanov, Anikovich, Borziac, 1980; Stanko, 1982; Anisyutkin, 1992; Sapozhnikov, 1994; Chirica, Borziac, Chetraru, 1996).

This evolutionary trend is represented by three succeeding industries (Anisyutkin, 1992). The early industry was called Duruitorian (Starye Duruitory Grotto and the sites of Yarovo and Mersyna). It was correlated to the Tayacien (or Evenosien) industry, which is characterized by the archaic technology yielding low Levallois and blade indices and a few bifacial forms (Chetraru, 1973). The middle proto-Stinkian industry (lower level of Vykhvatintsy Grotto, and the sites of Osypka, Shipot-2, and Bobuleshty-5) represents the advanced variant of the Duruitorian. The late industry has been designated as Stinkian industry (the Stinka-1, Shipot-1, and Mamaya open-air sites, and Buzduzhany-1 Grotto yielding typical leaf-shaped points-bifaces) The chronological sequence including these industries has been established as follows: the early industry has been dated back to Riss, the Proto-Stinkian industry has been affiliated to Riss-Würm and initial Würm, and the Stinkian industry has been dated to the first half of Würm (Anisyutkin, 1992). The diagnostic tool types include the nosed and carinated *grattoirs*, core-like scrapers and butt-scrapers, notched and denticulate forms; the noted technology of tool production is archaic (the percentage ratio of blades reaches 17% only in the assemblage associated with the upper level of Stinka-1, most probably representing the transitional or the Initial Upper Paleolithic industry) (Borziac, 1978). All these characteristic features are typical for the local "Aurignacian". The early Aurignacian complex of the Ripiceni-Izvor site located on the right bank of the Prut was dated to more than 30 ka ago (Paunescu, 1993). The principal implement types are mostly the same as those of Stinka, though a few regional forms of the typical Mousterian tools have been also identified within the latter collection. This suggests that the process of Upper Paleolithic industry evolution was not unidirectional.

It should be noted that the so-called Aurignacian *grattoirs* are numerous in the Duruitorian industry. This fact enables us to infer their existence in the region under discussion as early as the early Middle Paleolithic.

However, recently a group of European scholars has examined the Upper Paleolithic sites in Moldavia and proposed their own interpretation of the Middle to Upper Paleolithic transition in the region (Otte, Noiret, Lopez-Bayon, 1999) They have suggested that the trajectory of the evolution went from the eastern variant of the Micoquian via the Central European Szeletian to Aurignacian industries (Ibid.: 163). The non-local genesis of the Moldavian Aurignacian has been stressed. This interpretation of the original lithic industries can hardly be admitted especially for the so-called eastern Micoquian and Szeletian. These are characterized by a predominance of typical *racloirs* and few denticulate tools, if only Middle Paleolithic forms are taken into consideration (Valoch, 1957). On the other hand, all the collections attributable to the regional early "Aurignacian" are dominated by denticulate tools over *racloirs*. The Moravian Szeletian industries yielded the denticulate tools index of not more than 3%, while the "Aurignacian", with leaf-shaped bifaces from the Romanian part of Moldova (Mitok-Valia-Izvoroului, Ripiceni-Izvor) and from Moldova itself (lower level of Brynzeny Grotto), have yielded the correspondent share of more than 21%, the maximum share of *racloirs* being not more than 15% (Chirica, 1999). Moreover, the materials obtained from this series of sites show the constant presence of butt-scrapers, characteristic of earlier periods, as well as certain other tool forms specific for the Stinkian industry, which I have identified within the collections of the Mitok-Valia-Izvoroului open-air site and Brynzeny Grotto. In addition, it should be noted that the Stinkian industry yielded low

Levallois and blade indices. Only the technocomplex associated with the lower level of Stinka-1 showed a high blade proportion of 17%; while the portion of the Brynzeny Grotto collection, which had been examined by the present author and attributed to the final period of the initial Upper Paleolithic, yielded the corresponding proportion hardly reaching 27%. The currently known Aurignacian evidence obtained from the territories of the East Circum-Karpaty region, mostly from the Romanian part, differs from the true West European Aurignacian not only by the presence of leaf-shaped points-bifaces, but also by abundant notched and denticulate tools and an absence of blades with Aurignacian retouch. All these features, including certain specific tool forms like butt-scrapers and massive points, are characteristic of the regional Middle Paleolithic and suggestive of the continuity in its evolution. In this case, the transitional industries demonstrate low blade indices representing certain specificity in the Upper Paleolithic industries formation.

On the contrary, the authors of the debatable article regarded the laminar and Levallois technology as the features indicating the formation of the Upper Paleolithic industry. Such a straightforward argument is hardly acceptable. I would like to remind the reader that not only the Upper Paleolithic Stinkian-based industries of the Prut-Dniestr catchment-area but the Szeletian industries of Central Europe and the Streletsk Culture in East Europe have all revealed low lamination indices.

The Kulbulak Paleolithic site

Let me pass on to the discussion of the materials recovered from the Paleolithic site of Kulbulak located in western Central Asia. Otte and Kozlowski classified this collection as a blade-based technocomplex with abundant end-scrapers. The collection under discussion was recovered from the upper portion of the stratigraphic sequence, which was attributed to the Late Mousterian and Upper Paleolithic by M P. Kasymov (1990). In 1994 – 1995, the present author excavated this site together with his colleagues from Uzbekistan (Anisyutkin et al , 1995). The two uppermost layers yielded a lithic industry, which could not be referred to as a true blade-based industry. The blade category of the collection in question contains few typical Upper Paleolithic blades, the overall blade index being only 25, which corresponds to the Middle rather than to the Upper Paleolithic industries (Derevianko et al., 1999). No typical prismatic cores have been recorded: instead, disc-cores were uncovered. The prismatic cores were not characteristic of the archeological collection recovered from Kasymov's excavations. The tool kit associated with my collection was comprised of thirty-five specimens including eleven *grattoirs*, five *racloirs*, six irregularly retouched blades, six denticulate tools, two notches, two chisel-like tools; other solitary tool forms were encountered like a burin, a borer, and a point. The category of *racloirs* contains mostly classical specimens. The category of *grattoirs* does not include typical specimens fashioned on blades, while the category is dominated by atypical implements showing serrate edges made with the aid of fine, marginal retouch, including the carinated forms. The technocomplexes recovered from underlying Mousterian strata 3 and 4, which cannot be referred to as true Levallois, differ from the lithic collection of strata 1 and 2 in larger average dimensions of the implements, and in the occurrence of flat faced cores, including disc-shaped and Levallois varieties, which are characteristic of the Mousterian tradition. The tool kit is dominated by the typical *racloirs*; such categories as points, notched and denticulate tools, and classical end-scrapers on flakes were also encountered. The lower levels, which refer to the Middle and Early Mousterian (Kasymov, 1990), yielded the typical Mousterian forms fashioned mostly on non-Levallois blanks; few bifaces were encountered.

Conclusions

In sum, the European model of the Upper Paleolithic industry formation based on the predominance of laminar blanks cannot be adopted as a universal model for all the regions of the vast North Eurasia. Much attention should be paid to identifying diverse trends in the inner evolution of the regional Paleolithic industries.

Thus, in Uzbekistan, two major trajectories in the formation of the Upper Paleolithic industries may be established. Firstly, the Obi-Rakhmat tradition was based on production of middle-sized laminar blanks (Suleimanov, 1972). Secondly, the tradition illustrated primarily by the Kulbulak (Kasymov, 1972) and Samarkand (Lev, 1964; Dzhurakulov, 1987; Korobkova, Dzhurakulov, 2000) materials was based on non-laminar blanks. The Uzbekistan materials evidence a simple, or unilateral, transformation of the Middle into the Upper Paleolithic industries. A more complicated model has been noted in East and Central Europe (Anikovich, 2000). No traces of such an evolutionary trend have yet been found in western Central Asia. This trend may be designated as a "synthetic" and may be classified as an acculturation model.

Currently the Middle to Upper Paleolithic transition should be interpreted in terms of a technical-typological problem. Other aspects which certain authors usually concentrate their attention on (Vasiliev, 2000), such as the location of the sites, major economic activities, specificity of raw material procurement and transportation, functional specificity of the sites, all represent factors of secondary importance Both factual evidence and regional aspects are crucially important for the comprehension of the problem of the Middle to Upper Paleolithic transition. Ideally, two things are necessary: a considerable array of facts illustrating terminal stages of this transition, particularly, data from local Middle Paleolithic sites, and the availability of information for the final evolutionary stage, i.e., from the early and middle Upper Paleolithic sites.

The attempts to resolve the problem only on the basis of technological postulate (occurrence of laminar and Levallois technologies) ignoring the aspects of typology do not seem fruitful.

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AURIGNACIAN, MODERN MAN, AND THE TRANSITION FROM THE MIDDLE TO UPPER PALEOLITHIC IN NORTH EURASIA: A CENTRAL EUROPEAN APPROACH*

Introduction

First of all, I would like to congratulate the authors The geographical frame, from Anatolia to Japan, as well as the time span chosen for their article, from 200,000 to 10,000 years ago (Otte, Kozlowski, 2001: 52), gives us a new perspective on "the transition from the Middle to the Upper Paleolithic in North Eurasia " The discussion about the emergence of modern humans, their global spread, and the disappearance of the Neanderthals is indeed a Eurasian topic In doing so, they give us a comprehensive overview of material from regions where information was, or in part still is comparably sparse (e.g., China (Ibid.: 58 – 59)). Therefore, their article does "provide a basis for new reflections" (Ibid.. 60). The authors are also careful enough to see that "the actual state of knowledge permits us to propose [these] different scenarios, at least provisionally"(Ibid.). What are these scenarios, and what hypotheses follow from them?

The scenarios

The scenarios described are the following (Table)

Scenario 1. In Europe, the transition from the Middle to Upper Paleolithic is described as a three-step process: a regionally diverse Upper Middle Paleolithic made by Neanderthals is confronted by the Aurignacian that is, together with an anatomically modern population, of "external origin" and represents its "own elaborate technology". Acculturation and interbreeding of these two populations encourage "the emergence of capacities already present within the Mousterian" (Ibid.: 52) and lead at the end of the passage to the Middle Upper Paleolithic. This process is classified as "very particular, and perhaps unique" (Ibid.: 51).

Scenario 2. In most of the North Eurasian regions under study the authors observe progressive Late Middle Paleolithic industries that share "leptolithic elements," while at the same time showing differences due to regional variables, e.g., shaped pebbles. With one exception (see Scenario 5), "each tradition later conserved traces of its origins" (Ibid.: 60).

Scenario 3. The Middle Paleolithic industries are followed by Upper Paleolithic industries defined by an "irreversible" dominance of "standardized laminar blanks" from different kinds of "blade technology" (Ibid.: 51). Roughly speaking, Upper Paleolithic assemblages defined as such appear about 40 ka BP.

Scenario 4. The transitional process in North Eurasia has no "strict relation with the anatomic forms concerned. In contrast, there seems to be a complete distinction between transformations of cultural order and the physical characteristics of the population" (Ibid.: 59).

Scenario 5. Aurignacian finds dated approximately 35 – 29 ka BP are reported from Afghanistan (Kara Kamar) as well as from the Altai (Ust-Karakol-1) (Ibid.: 55). Unlike the other industries involved in the transition from the Middle to the Upper Paleolithic in North Eurasia, these assemblages bear no traits of a regional Middle Paleolithic and therefore have no regional ancestors.

The hypotheses

The hypotheses put forward by the authors are the following.

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* Comments on the article by M Otte and J.K Kozlowski *The Transition from the Middle to Upper Paleolithic in North Eurasia* (2001).

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Table. Overview of the North Eurasian scenarios described by M. Otte and J.K. Kozlowski (2001) in comparison to the Central European scenario (correlation of Dansgaard/Oeschger events and European interstadials after (Weissmüller, 1997)).

MP – Middle Paleolithic, UP – Upper Paleolithic

ka BP	Dansgaard-Oeschger event	Europe		Zagros and bordering regions		Central Asia and the Altai		East Siberia		Mongolia		China	
		Sites and industries	Fossils	Sites and industries	Fossils	Sites and industries	Fossils	Sites and industries	Fossils	Sites and industries	Fossils	Sites and industries	Fossils
20	2	UP Epi-Gravettian (?)	Modern	UP Baradostian with Aurignacian and Mousterian elements		UP with bladelets and pebble elements (Samarkandskaya)	Modern	UP with wedge-shaped cores (Dyuktai Kokorevo (~15 – 13 ka BP), Ust-Mil (~22 ka BP))		UP macrolaminar industries on Levallois base		UP a) laminar industries with backed points b) industries with bone implements c) industries with bifacial tools	
25	3	UP Pavlovian (Gravettian (?)) with Corbiac method and backed implements, serial production of art						Arembovskogo (?) Makarovo IV (?)					
30	7	UP Late Aurignacian with art (Vogelherd, Geissenklösterle AH III)				UP Aurignacian (?) (Kara-Kamar, Ust-Karakol-1, level 10 (35 ka BP))		UP (?) with laminar technology based on Levallois concept (Varvarina Gora, Tolbaga)		MP/UP Transition with Levallois concept (Chikhen Agui, upper part of stratum 3 (21 ka BP), Chikhen Agui, lower part of stratum 3 (27 ka BP), Chikhen Agui, locus 2 (30 ka BP))		UP laminar technique based on bipolar cores (Shundonggou)	
35	Denekamp 8	UP Late Aurignacian with flakes and blades bone implements and adornments (Geissenklösterle AH III, Willendorf, Grota di Fumane)	Neanderthals	MP/UP Transition Earliest Baradostian industries (Shanidar, (~ 36 ka BP), Yiteh (40 ka BP))		UP (?) with volumetric cores and/or Levallois tradition (Obi-Rakhmat (40 ka BP), Kara-Bom)		UP (?) with *Methode Rocourt* (Makarovo IV (~28 – 70 ka BP), Arembovskogo (~35 – 25 ka BP))					
40					?	MP/UP Transition (Obi-Rakhmat, Kara-Bom)			?	——(?)—— MP with Levallois concept and prevailing flakes (Moiltyn am)	?	MP with discoid method and modified pebbles (Zhoujiayoufang, level 1-4 (~ 30 – 40 ka BP), Sharaosso-gol (~ 35 – 28 ka BP))	?
45	12 Hengelo	MP Levallois recurrent, Quina and/or discoid methods with blade production (Mousterian) with or without bifacial tools (Micoquian Szeletian)		MP Mousterian of Levallois recurrent facies with leptolithic elements (Zagros Mousterian) (Warwasi, Shanidar, Ghar-i-Khar)		(Ust-Kanskaya, Kara-Bom (43 ka BP), Teshik-Tash (^{234}U 44 ka BP))	Neanderthals						
50	14 Glinde					MP Mousterian of Levallois recurrent facies with leptolithic core reduction (Obi-Rakhmat)				MP with bifacial tools (pre-Mousterian)			
	16 Oerel												
60	18					Moustero-Soanian with pebble tools (Kara Bura Khudzhi, Piez, Ak-Djar)							

Hypothesis 1. The Aurignacian assemblages in Afghanistan and the Altai are considered to be the result of human migrations from bordering regions (Ibid.: 59).

Hypothesis 2. In contrast to all other Early Upper Paleolithic industries in North Eurasia, where the producers cannot be named in anthropological terms, the Aurignacian is correlated with modern man, i e., with *Homo sapiens sapiens* (Ibid : 52).

Hypothesis 3. As a consequence, the appearance of Aurignacian assemblages in Afghanistan and the Altai gives evidence not only for the presence of *Homo sapiens sapiens* in the area at about 35 ka BP, but also for the movement of modern populations (Ibid · 55).

Hypothesis 4. The Aurignacian migrates together with *Homo sapiens sapiens* from Central Asia into Europe and the Levant (Ibid.: 60).

Before discussing these hypotheses, I would like to revisit the general definitions and assumptions made by the authors, deal with the scenarios themselves, and try to formulate some expectations which should be fulfilled if the hypotheses are valid.

The definitions

In the introduction, the authors give two definitions which have a basic influence on the classification of the industries and therefore on the description of the scenarios· "In Europe, the Middle Paleolithic continues to be defined on a technological basis: the toolkits are made on blanks that have been prepared by shaping of the core. [...] The Upper Paleolithic is defined, in contrast, by the use of standardized laminar blanks" (Ibid.: 51). Thus, the definite difference between the Middle and Upper Paleolithic is seen in technological terms restricted to stone tool production. Definitions do not require proof. Their importance lies in the fact that they should work in respect to clarity and sufficiency. The definitions given in the text seem to be problematic regarding both of these two requirements. First, clarity is lacking – as the authors admit themselves when they say that the use of standardized laminar flakes "was present in the Mousterian technology because it appeared sporadically at different times and different places" (Ibid.) As a solution, they offer an appendix, saying that with the Upper Paleolithic the "blade technology became dominant and was imposed as an irreversible formula" (Ibid.)

Regardless of the fact that it is not clear whether this is meant in a qualitative or quantitative way, there are examples from the European Upper Paleolithic contradicting this part of the definition, although they come from a region where – according to the authors – this definition should fit best. Within the Châtelperronian (Pelegrin, 1995), dated between 40 and 32 ka BP, at least three concepts for the production of blanks have been described: Levallois, discoid, and a special concept for the production of laminar blanks transformed to Châtelperronian points. Assemblages of the Badegoulian from the onset of the Magdalenian development around 18 ka BP show no less than four different operational schemes (Fourloubey, 1998). Only one, which is applied randomly, leads to blades, while the other three use a direct hard hammer technique and deliver short flakes (for the production of *raclettes*) or a set of flakes, laminar flakes and blades. Speaking of the dominance of blades in quantitative terms, it should also be mentioned that within the Central European Aurignacian (Fig. 1) only approximately one half of the assemblages do show a dominance of blades and laminar flakes (Uthmeier, in press). Among the flake-dominated assemblages we find sites like Lommersum, which cannot be placed in an early phase, and sites like Langmannersdorf and Breitenbach, which are presently considered as Epi-Gravettian (Street, Therberger, 2000). As a consequence, the dominance of blades in the Central European Aurignacian is not "an irreversible formula" and not due to any chronological trend, but most probably differs due to strategies of raw material procurement or different activities carried out at the sites.

The examples underline the problem of defining the Upper Paleolithic as a period where blade technology is dominant: on the one hand we have evidence for industries with high frequencies of elongated flakes and blades during the time conventionally termed as the Middle Paleolithic (see (Conard, 1992)), while on the other hand we find data coming from the Upper Paleolithic that clearly demonstrate a heterogeneity of concepts for the production of blanks, including times where flakes did dominate over blades.

Some of the latter problems have their roots in the lack of sufficiency of the given definitions. Even if the borderline between the Middle and Upper Paleolithic should be restricted to technological features of stone tool production – and here the dominance of blade-technology – it is of great importance to know the concepts of blank production which are responsible for the counted number of blades. Is the production of laminar blanks and/or blades resulting from a Middle Paleolithic concept, with cores where surfaces are prepared and then utilized, or from an Upper Paleolithic concept with a volume that is reshaped by its main products, the blades, while being utilized (Boëda, 1990)? Although this is sometimes difficult to determine, the method of the *chaîne opératoire* (Geneste et al , 1990) gives us an opportunity to look for answers to this important question. Without information about the character of the *chaîne opératoire* it is not possible to reliably classify an assemblage as technologically "Middle Paleolithic," "Transitional" or "Upper Paleolithic".

Additionally, it is at least problematic to use a definition based on only one variable (here: the frequency

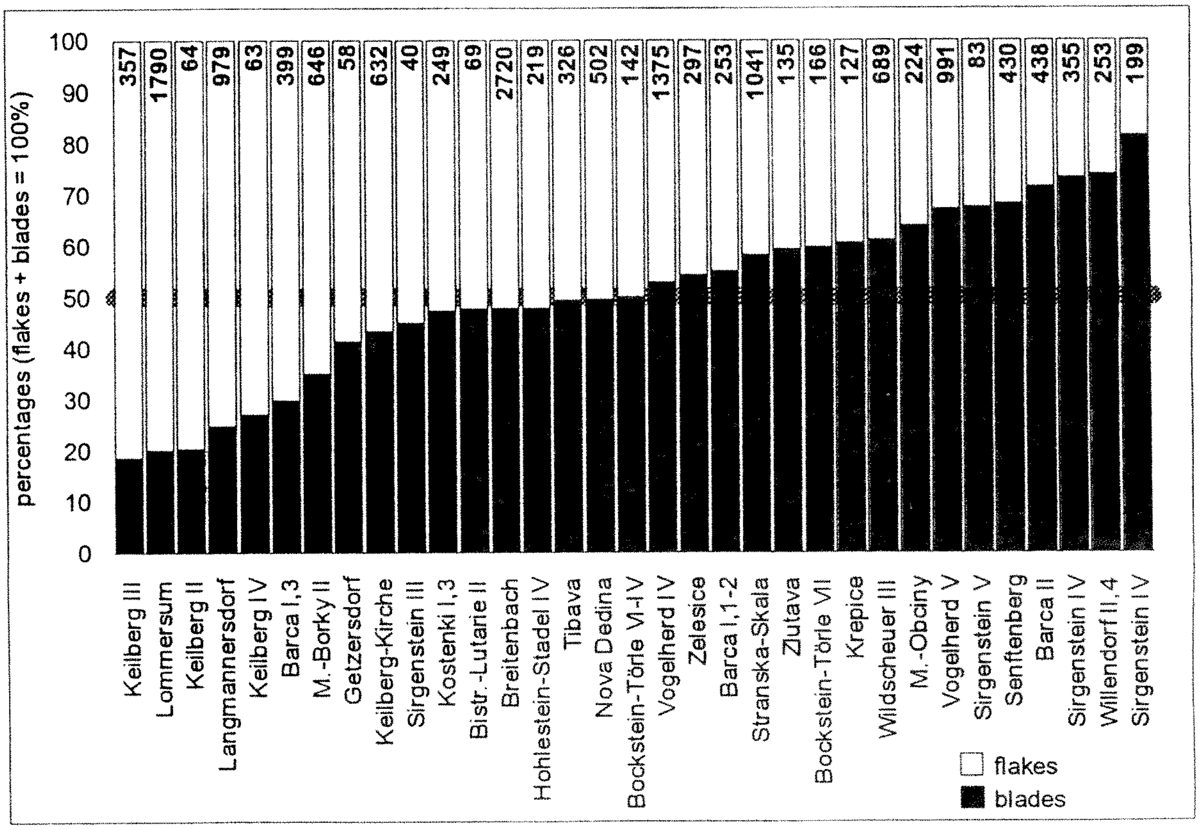


Fig. 1. Percentage of flakes and blades in Aurignacian assemblages from Central and East Europe (after (Hahn,1977: tables 2, 4; Uthmeier, 1994: table 78)).

of blades), even if components like "art, pendants, bone tools" do not appear relevant to the discussion outside of Europe (Otte, Kozlowski, 2001: 51); a controversial opinion can be found in Otte and Kozlowski (Ibid.: 59): "The different cases [...] manifest a similar tendency towards the size reduction of lithic blanks and the progressive introduction of bone tools" (see also for a Levantine perspective (Marks (1994)). There are other variables that also play a role in the discussion about the passage from the Middle to Upper Paleolithic. These components refer to the life ways of the people: the settlement system, including – among others – the raw-material procurement, the number and the length of the moves, the activities at different localities and therefore the duration of settlement, the game hunted and the size of the annual logistical territories. It is my opinion that changes in the mode of blank production are highly correlated with changes of the settlement system and ecological behavior, leading to different needs in the technological sector (see, e.g., (Marks, 1988)) as well as to different social and demographic situations (cf. for demographic dates (Zimmermann, 1996)). At the same time, it becomes obvious that the definitions given by Otte and Kozlowski are too general to elucidate the "internal processes of organization of the Middle Paleolithic and those [industries] which led to the emergence of new behavioral forms" (Otte, Kozlowski, 2001: 52).

Sufficient and distinct definitions for the Middle and Upper Paleolithic, on the other hand, might only be working when restricted in, or modified in reference to, space and time (Uthmeier, 1998). Even then, a consequent application of such multi-variate definitions (for first attempts see (Mellars, 1973; White, 1982)) might lead in the future to a modification of conventional chronological frameworks. In Europe for example, it is not earlier than the Gravettian that Upper Paleolithic life ways are fully employed, a view that is also shared by Otte and Kozlowski (2001: 52) (see also (Uthmeier 1998, 2000)). What is now called "Early Upper Paleolithic" and includes (among others) the Châtelperronian, the Streletskaya Culture and the Aurignacian (Bosinski, 1990) should better be named "Transitional," as A.P. Derevianko et al. (2001) have already supposed for assemblages from the Altai region.

The assumptions

Besides these definitions, Otte and Kozlowski make an assumption based on the European data that is also essential for their hypothesis: "Anatomically speaking, our position must also be clarified: according to us, the

Aurignacian was transported by a new population, of exogenous origin and anatomically evolved. It does not appear possible to support a local origin for modern humans in Europe" (2001: 52). The correlation between culture (or more precisely, lithic tool industries) and anthropology has always been a tricky task – at least after evidence for both early Moderns and Neanderthals found in Mousterian layers in the Near East. The authors themselves report that in North Eurasia "there seems to be a complete distinction between transformations of a cultural order and the physical characteristics of the populations" (Ibid.: 59) The data known so far from Europe (Fig. 2) supports this observation – also in the case of the Early Aurignacian. The earliest secure remains of European *Homo sapiens sapiens* is a skull coming from the Aurignacian of the Vogelherd (specimen "Stetten I") and has been dated by radiocarbon method at about 30 ka BP (Czarnetzki, 1983). Other industries of the European Early Upper Paleolithic, like the Châtelperronian (for an overview see (Pelegrin, 1995)), the Ulluzzian (Gioia, 1990) or the Szeletian (Allsworth-Jones, 1986), delivered human remains that were either securely classified as Neanderthals (e.g., St. Cesaire (Leveque, Vandermeersch, 1980)) or, in some cases, discussed as *Homo sapiens sapiens* (e.g., Arcy-sur-Cure (Leroi-Gourhan, 1959) and Combe Capelle (Asmus, 1964)). New absolute dates made in part directly on fossil remains showed that Neanderthals were present in Europe until approximately 30 ka BP (Barton et al., 1999; Hublin et al., 1995; Smith et al., 1999). The fossil record of Europe clearly speaks for the presence of Neanderthal man at the moment when the transition between Middle and Upper Paleolithic started at 40 ka BP, but cannot prove for sure the presence of *Homo sapiens sapiens* (see Fig. 2). On the other hand, the transitional process in Europe does not only include progressive industries with a distinct Middle Paleolithic character, such as the Châtelperronian or the Szeletian, but also the Aurignacian. Although some of the oldest dates, e.g., Bacho Kiro or Istallóskõ, remain a point of discussion, secure data from long stratigraphical sequences in Spain (Bischoff et al., 1989), along the Danube (Hahn, 1993, 1995, Street, Therberger, 2000) and southward of the Alps (Bartolomei et al., 1993) support the idea that Aurignacian tool kits were made in Europe well before the first *Homo sapiens sapiens* was firmly on the scene. At present, the question of whether modern man was responsible for the earliest European Aurignacian assemblages must remain an open one. This is no contradiction to the hypothesis that the origin of anatomically modern people must be searched for outside of Europe, but at the same time we have to think about a transition where "we do not observe a strict relation with the anatomic forms concerned" (Otte, Kozlowski, 2001: 59).

The scenarios revisited

In the scenarios described, the border, or transitional phase, between the Middle and Upper Paleolithic remains indistinct in some cases. This might in part be a result of a prehistoric reality, when Levallois concepts survive in Central Asia and the Altai (Kulbulak (Ibid.: 53)), Mongolia (Chikhen Agui (Derevianko et al., 2001)) and East Siberia (Escutenaire-Sitlivy, Siltlivy, 1996) for a long time. According to their estimated age or due to absolute dates these assemblages are placed between 35 and 21 ka BP, a time when elsewhere the Upper Paleolithic is well established. On the other hand, it is the univariate definition by the presence of a "high frequency of blades" that leads to a classification as "Upper Paleolithic," although the *chaîne opératoires* are in most cases Middle Paleolithic concepts (blanks and cores of Middle Paleolithic (mainly Levallois) concepts are found in Otte and Kozlowski (2001: fig. 3, *8*, *9*; 5, *6*, *11 – 13*, 7, *10*; 9). According to C. Escutenaire-Sitlivy and V. Siltlivy (1996), Makarovo IV, Arembovskogo and Tolbaga are based on different recurrent methods of the Levallois concept plus a Middle Paleolithic "*Méthode Rocourt*" with "subvolumetric" cores and *éclats debordants*. At the same time, a typical Upper Paleolithic technology is absent (Escutenaire-Sitlivy, Siltlivy, 1996: 53).

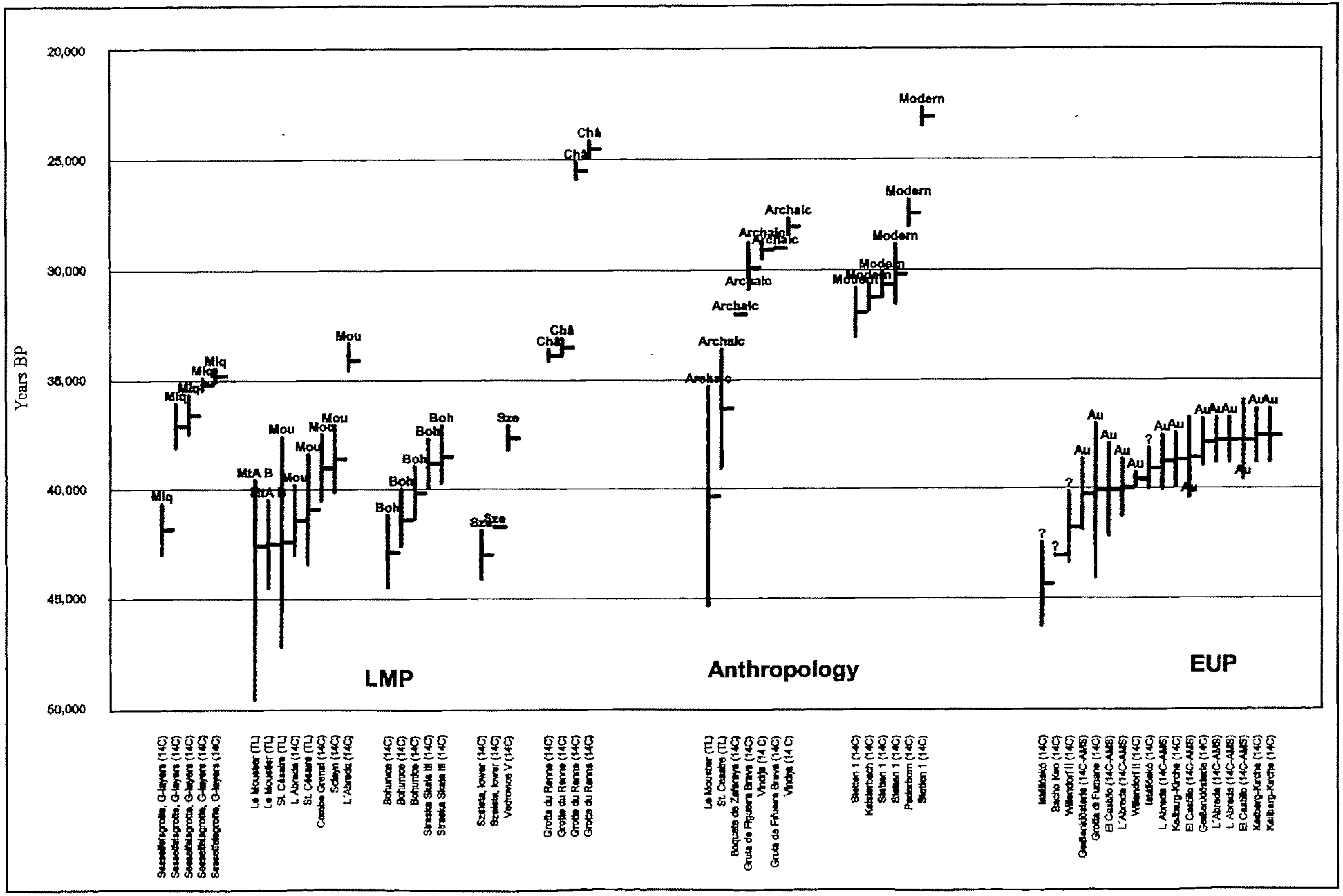
If a more detailed definition of the Middle and Upper Paleolithic would have been applied that included the *chaînes opératoires* which are responsible for the number of blades and, as a result, for high frequencies of Upper Paleolithic tool types, most of the cited Early Upper Paleolithic assemblages of Central Asia, the Altai, East Siberia and Mongolia would have better been classified as Middle Paleolithic.

Although the presence of all in all two isolated Aurignacian (or "Aurignacoid"(Otte, Kozlowski, 2001: 56, fig. 6)) assemblages in the Altai region and in Afghanistan is of essential importance, it is not clear what kind of Aurignacian it is supposed to be nor what criteria were used to classify the assemblages of Ust-Karakol and Kara Kamar. In the case of Kara Kamar (Coon, 1958: 228), the publication does not reveal any information about the retouched pieces except for two drawings, a retouched blade and a carinated end-scraper. According to the excavator, most pieces where thrown away during the field work. The dates, made in 1954 with a minimum age of > 34 ka BP, show the limitations of the dating technique at that time.

Ust-Karakol, on the other hand, is an assemblage which has carinated tools (Otte, Kozlowski, 2001: fig. 6, *2*, *6 – 8*), but the blank production shows traces of the Levallois concept (Vasiliev, 2001). Again, the occurrences of one variable (here, carinated pieces) is not a sufficient criteria for a classification as "Aurignacian" (Demars, Laurent, 1992: 44): these tools

Fig 2. Selection of the latest Middle Paleolithic (LMP, left) and earliest Early Upper Paleolithic (EUP, right) dates in comparison to absolute dates for latest Neanderthals (Archaic) and earliest securely classified *Homo sapiens sapiens* (Modern) in Europe (after (Allsworth-Jones, 1986; Bischoff et al , 1989; Hahn, 1977, 1995, Mellars, 2000; Paposo, 2000, Richter, 1996, 1997))

Miq – Micoquian, Mou – Mousterian, MtA B – Mousterian of Acheulian tradition B, Boh – Bohunician; Sze – Szeletian, Châ – Châtelperronian; Au – Aurignacian



made from massive blanks can be traced through the whole Upper Paleolithic period.

Some indicators for the Central Asian hypothesis

To verify the hypothesis of Otte and Kozlowski that the Aurignacian originates in Central Asia, some expectations (or more precisely, indicators), must be fulfilled.

1. If the Aurignacian occurrences in the Altai and in Afghanistan are the result of migrations, then there must be a bordering region in Central Asia where Aurignacian assemblages of the same type are older.

2. If the Aurignacian is an autochthonous development within this region, than there must be Late Middle Paleolithic assemblages which show specific progressive elements. This should not be restricted to high frequencies of blades, because they might appear "sporadically at different times and in different places" (Otte, Kozlowski, 2001: 51), or even with a long regional tradition (Monigal, 2001). At the same time, the first Aurignacian assemblages should show specific traces of that regional Late Middle Paleolithic.

3. If modern man is responsible for the Aurignacian in Central Asia, then there should be fossils of *Homo sapiens sapiens* connected with it.

4. If there is a movement of *Homo sapiens sapiens* into Europe and the Levant indicated by assemblages of the Aurignacian, then there must be elements in the European and Levantine Aurignacian that show a close relation to the region of origin.

5. If the origin of the Aurignacian lies in Central Asia, and not in Europe or the Levant, then the estimated or measured absolute dates for Aurignacian occurrences should be older.

The Central Asian hypothesis tested

To what extent are these expectations fulfilled? In the first place, data are missing from the region where the origin of the Aurignacian is looked for. At the moment, no Aurignacian finds have been reported from the bordering regions of the Altai or Afghanistan. This also means that apart from the general observation that the Late Middle Paleolithic in North Eurasia shows a development towards a more effective use of raw material by a more intense production of blades, no relation between the first hypothetical Aurignacian assemblages and the Middle Paleolithic that gave birth to them can be proven. With Levallois pieces, the "Aurignacoid" assemblage from Ust-Karakol does show Middle Paleolithic traits, but they are not specific, while at the same time they make a classification as "Aurignacian" in a European sense (Hahn, 1977) not probable.

According to the paper under discussion, in Central Asia the earliest *Homo sapiens sapiens* fossil was found in Samarkand in a Late Upper Paleolithic industry with shaped pebbles and bladelets, but without Aurignacian elements. The only human fossils cited for the time of the transition are the late Neanderthal remains from Teshik-Tash (Otte, Kozlowski, 2001: 53). It follows that the correlation between early Aurignacian artifacts, or Early Upper Paleolithic features in general, and modern man in North Eurasia remains as unsecured as in Europe.

The intrusion of Aurignacian elements into the Levant is still an open question. While some authors (e.g., (Stringer, Gamble, 1993)) support the hypothesis of a spread of the Aurignacian from the Levant to prove an "Out-of-Africa II" origin of *Homo sapiens sapiens*, there are others who deny a connection between the Aurignacian in the Levant and in Europe (Uthmeier, 1998), or even think about an intrusion of Aurignacian assemblages into the Levant (Bar-Yosef, Belfer-Cohen, 1996). In comparing some definitions given, it becomes obvious that what at the moment is called "Aurignacian" might include several industries sharing carinated pieces as one defining element. European Aurignacian assemblages should combine carinated end-scrapers and burins, notched blades and, if present, bifacial pieces with bone points with massive or splintered base; flakes should dominate over blades (Hahn, 1977). At numerous sites pendants mainly made out of teeth and ivory complete the assemblages. In the Levant, however, the Aurignacian toolkit consists mainly of carinated and nosed scrapers, but few retouched blades and bladelets (Bar-Yosef, Belfer-Cohen, 1996: 143). Pendants are rare, and the bone industry typologically limited (Ibid.). Regardless of this diversity of the Aurignacian, a connection between both the Levant and Europe with assemblages from the Altai and Afghanistan cannot be proven, because the North Eurasian remains are largely unknown except for the occurrences of carinated end-scrapers and blades.

The lack of a decrease of absolute Aurignacian dates from one formerly supposed center of origin, the Levant, towards Europe has already been a point of criticism for the classical "Out-of-Africa II" hypothesis (Richter, 1996). A comparison between the dates given for the transition from the Middle to Upper Paleolithic in North Eurasia and Europe (see Table) shows the same effect. Neither the oldest dates for the Baradostian nor the earliest Upper Paleolithic levels at Kara-Bom with volumetric cores (Dérévianko, Pétrine, 1997) are significantly older than early Aurignacian radiocarbon dates from Europe, e.g., El Castillo (Bischoff et al., 1989), Geissenklösterle (Hahn, 1995) or Grotta di Fumane (Bartolomei et al., 1993).

In sum, the fact that in North Eurasia "each tradition later conserved traces of its origins" (Otte, Kozlowski, 2001: 60) and considerably late assemblages in part must be classified as "Middle Paleolithic" or "Transitional" until approximately 30 ka BP or even later, gives way for

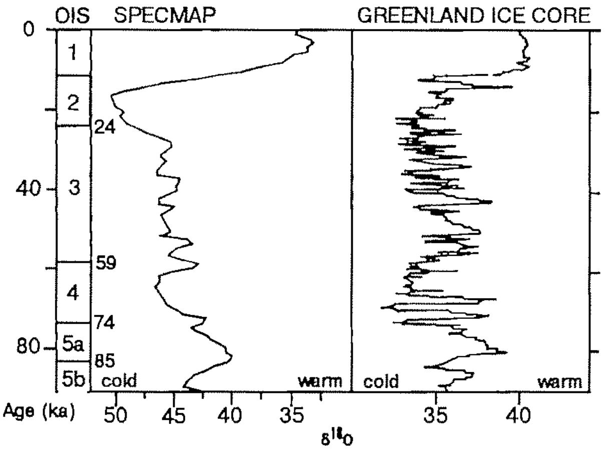


Fig. 3 The SPECMAP-curve (left) resulting from ^{18}O isotopes and showing a gradual increase in the global continental ice volume and therefore a decrease of mild conditions during OIS 3, while the Dansgaard/Oeschger events in the Greenland ice core (GRIP, right) show that this process is accompanied by abrupt changes of warm and cold spells (diagram and explanation after (Davies et al., 2000: fig. 1.1)).

an alternative interpretation: because a fully developed Upper Paleolithic arrives apparently late, North Eurasian regions are not the center of the European and/or Levantine Upper Paleolithic development, but – at least in part – Late Middle Paleolithic refuges. Such an interpretation, based on the presence of Middle Paleolithic industries dated about 30 ka BP testified by absolute dates and/or long profiles, is well known from the Iberian (Tattersall, 1995) and the Crimean peninsulas (The Middle Paleolithic.. , 1998). In other regions, like the Altai (Dérévianko, Pétrine, 1997), an autochthonous transition from the Middle to Upper Paleolithic might have taken place, but without development towards the Aurignacian.

My own view on the Aurignacian: A Central European approach

If the Aurignacian did not develop in Central Asia, and if the Levant origin is also incorrect, is it possible to propose another region? Some of the main variables of the European scenario, as I see it, have already been stated above: the anthropological data known so far cannot prove a movement of *Homo sapiens sapiens* into Europe before 32 ka BP. Archaeologically, there is no proof yet for an intrusion of the Aurignacian into Europe. Furthermore, it is still an open question whether *Homo sapiens sapiens* came "Out-of-Africa II" (Stringer, Gamble, 1993; Krings et al., 1997), developed "multiregionally" (Wolpoff, 1989) or interbred with local Middle Paleolithic Neanderthals (Duarte et al., 1999). As long as the European fossil record is thought to be incomplete, only cultural scenarios should be discussed, while anthropological arguments should be left aside.

Culturally speaking, the Central European Middle Paleolithic indeed has evolutionary capacities. But, if looked at on a multivariate scale, these capacities are not provoked by the Aurignacian. Much earlier, during the first half of the Weichselian Interpleniglacial, we observe not only a tendency towards the increasing use of blades from Levallois cores, but also the use of a sophisticated system of bifacial tools including backed knives ("Keilmesser"), handaxes (Richter, 1997) or leaf points (Uthmeier, 2000). These often resharpened pieces have long histories of use, are often transported (Richter, 1997) and are therefore a sign of a "preparation for anticipated periods" (Uthmeier, 2000). For the first time, this happens on such a large scale that several cultural entities like the Mousterian of Acheulian tradition, the *Moustérien a petit bifaces*, and the Micoquian are defined due to this strategy of great depth of planning, a feature also found in the French Mousterian (Geneste, 1988). The blank production shows a great diversity, ranging from Quina, and Levallois to the discoid concept (Boëda, 1995; Richter, 1997). In some cases, there are also volumetric blade cores and/or cores with unprepared flaking surfaces (Uthmeier, 1998, 2000), the latter exploited by the use of central scars (for blades) and *éclats débordants* (for the preparation of lateral convexities). While some Middle Paleolithic sites delivered microliths probably hafted (Richter, 1997), others yielded bone points (Gaudzinsky, 1998; Wagner, 1983) or other artifacts from bone or antler (Gaudzinsky, 1998). The analysis of the raw material procurement (Richter, 1997) has shown that the Late Middle Paleolithic settlement system is composed of camps where people stayed longer, and ephemeral camps (see also (Chase, 1989; Müller-Beck, 1988)). During longer stays, bifacial tools were manufactured on site (Richter, 1997), homogeneous raw materials were used for the production of elongated flakes and blades, and frequencies of Upper Paleolithic tool types were significantly higher (Uthmeier, 1998, 2000). It follows that at European Late Middle Paleolithic long-term sites, many Upper Paleolithic components are found (Uthmeier, 2000), most probably due to economic reasons (Kuhn, 1995).

Compared to the Late Middle Paleolithic, the Early Aurignacian shows little to no differences concerning the strategy of raw material acquisition (Floss, 1994) or the organization of camps. In addition, there are Middle Paleolithic stone tool traditions. While the presence of bifacial pieces remains uncertain (Trnka, 1990), the Aurignacian concept for the production of blades shows some main Middle Paleolithic features (Uthmeier, in press). Most important is the observation that the production of blanks, although using volumetric cores, delivers a set of thick flakes, ordinary flakes and laminar flakes, blades and bladelets.

All in all, the transition from the Middle to Upper Paleolithic in Europe can be successfully described as a step-by-step autochthonous development in which the strategy of base camps where toolkits for special activities was developed, hunting became seasonal and/or specialized (Gaudzinsky, 1998), the frequency of artifacts from bone, antler and ivory grew, and the improvement of blade concepts towards volumetric cores was more and more established along the time axis. The catalyst for this process might be found in the decreasing temperatures during IOS 3 between the LGMs at 59 and 24 ka BP, indicated by the SPECMAP-curve (Fig. 3) based "on a global oceanic oxygen statigraphy calibrated with the orbital cycles of the earth" (Davies et al., 2000).

Some components of distinct Upper Paleolithic character, like the exchange of non-utilitarian artifacts over long distances (Taborin, 1990), can be interpreted as indicators of growing information systems (see (Gamble, 1999)) and increasing distances of raw material transport (Féblot-Augustins, 1993, Floss, 1994). This might be the result of increased distances of moves, as the annual territories develop towards Upper Paleolithic sizes (Hahn, 1987), and/or due to a growth of population density (Zimmermann, 1996), maybe in the course of an ongoing contradiction of the space inhabited during colder phases of OIS 3 (see (Weniger, Orschied, 2000)). Such a development, caused by sinking temperatures, might not be restricted to, but should have the greatest effect in the wider vicinity of the Danube Valley, a region of continental climate between the Scandinavian and the Alpine ice-shields. As competition among these groups increases and social situations become more open, signs like pendants made out of shells, teeth, bone or antler might have been needed, because they are able to indicate the membership of individuals to specific groups or alliances. For such behavior, only single examples are known so far from the Middle Paleolithic, e.g., in Prolom I (Stepanchuk, 1993) or Tata (Vértes, 1964).

Although the beginning of the Gravettian marks the very end of this process in Europe, there might have been an important hiatus before. Only in its late phase, from about 32 ka BP onwards, the Aurignacian people created a complicated, yet not fully understood system of non-verbal communication either in rock art (for an overview see (Bahn, Vertut, 1988; Bosinski, 1990)); in the Grotte Chauvet, France (Chauvet et al., 1995); maybe also in the Near East at Hayonim cave (Bar-Yosef, Belfer-Cohen, 1996), or as figurines like the well-known sculptures from the Vogelherd, Geissenklösterle and Hohlenstein-Stadel in the Swabian Alps, Germany (Hahn, 1986). In contrast to the pendants and shells which must be seen as more simple personal ornaments, these pictures and figurines seem to yield social information used in and between groups. They are indicators for new structures of social organizations, pointing to prestige and maybe ranked societies. Compared to the assumed structure of Neanderthal societies, these changes might mark the arrival of a new, socially more modern population in Europe.

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THE TRANSITION FROM THE MIDDLE TO UPPER PALEOLITHIC IN THE WESTERN TRANS-BAIKAL*

Introduction

The history of the Paleolithic in the Trans-Baikal (the area immediately east of Lake Baikal) has been studied for more than 120 years. Currently, a series of publications has been released dealing with a variety of issues involved in the study of this problem (Okladnikov, 1959; Okladnikov, Kirilov, 1980; Abramova, 1989; Konstantinov, 1994; Lbova, 2000, etc). Recently, a number of new sites affiliated with the Middle to Upper Paleolithic "transitional period" and the Initial Upper Paleolithic has been discovered and research is ongoing. Many of these sites are not known to foreign investigators, and certain sites have been only briefly reported in Russian-language archaeological literature. Such inadequate publication of research results hampers the establishment of reliable geographic and chronometric correlations.

Recently, a sufficient body of materials has been collected providing evidence for an early Lower Paleolithic occupation of the territory in question. Crucial evidence has been obtained from such sites as Zasukhino, yielding a technocomplex with a pebble industry in the southeastern Cis-Baikal (Lbova, 2001a) and from a cluster of sites known by the common name Selger, yielding an industry of bifaces with Levallois technology (these sites are located in southern Buryatia, near the Mongolian frontier). The Middle Paleolithic period is illustrated by technocomplexes recovered from the Khotyk site's lower levels associated with the Early Zyrian and Kazantsevian sedimentation periods (from 55 – 60 to 130 – 150 ka ago). The collections associated with these levels demonstrate the pebble tool tradition as well as the Levallois and proto-prismatic reduction techniques. Technocomplexes of the "transitional period" and Initial Upper Paleolithic constitute another large series of materials, which have been accumulated over a 20-year period The industries from the Varvarina Gora, Kamenka, Tolbaga, Podzvonkaya, and Khotyk sites provide evidence of the dynamic evolution of anatomically modern humans and the development of Paleolithic culture. The materials recovered from the sites of Oshurkovo, Studenoe, Ust-Menza, Ust-Kiakhta, Masterov Kliuch, Ust-Itantsa, and Mukhor-Tala, among others, represent the subsequent stage in the development of Stone Age culture in the Trans-Baikal, namely the classical and final Upper Paleolithic In summary, the available data allow researchers to elaborate a general pattern of Paleolithic development in the Trans-Baikal (Konstantinov, 1994; Lbova, 2001b).

Approaching the problem of the Middle to Upper Paleolithic transition requires discussion of available evidence on the basis of identical methodological principles. The present paper focuses on such a discussion of industries recovered from the northern Trans-Baikal. Since 1989, geological-archaeological territories have been established in the Brianka and Ona river basins in the northwestern Trans-Baikal yielding the sites of Kamenka, Varvarina Gora, and Mukhor-Tala-4 from the former, and the Khotyk site in the latter region (Lbova, 2000). On the basis of information obtained from these sites, Trans-Baikalian variants of Paleolithic cultures have been established and correlated with other industries

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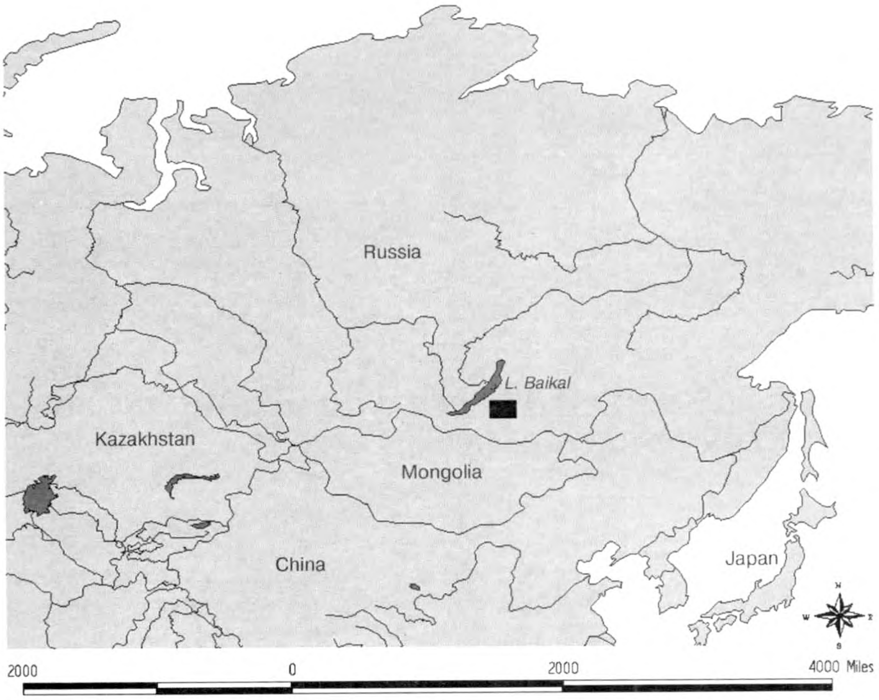


Fig. 1. Map showing the location of the study area.

within wider geographical areas in terms of "historical-cultural" affinities. The current status of Paleolithic studies in the Trans-Baikal allows interpretations of technological developmental trends on the basis of evidence obtained from larger regions, rather than identifications of particular local archaeological cultures (e.g., the Tolbaga and Kunalei cultures identified by M.V. Konstantinov). Each technocomplex or series of sites demonstrates individual features explainable as cultural variability and/or functional specificity based on the current state of our knowledge of the subject.

Geomorphology, paleogeography, and stratigraphy

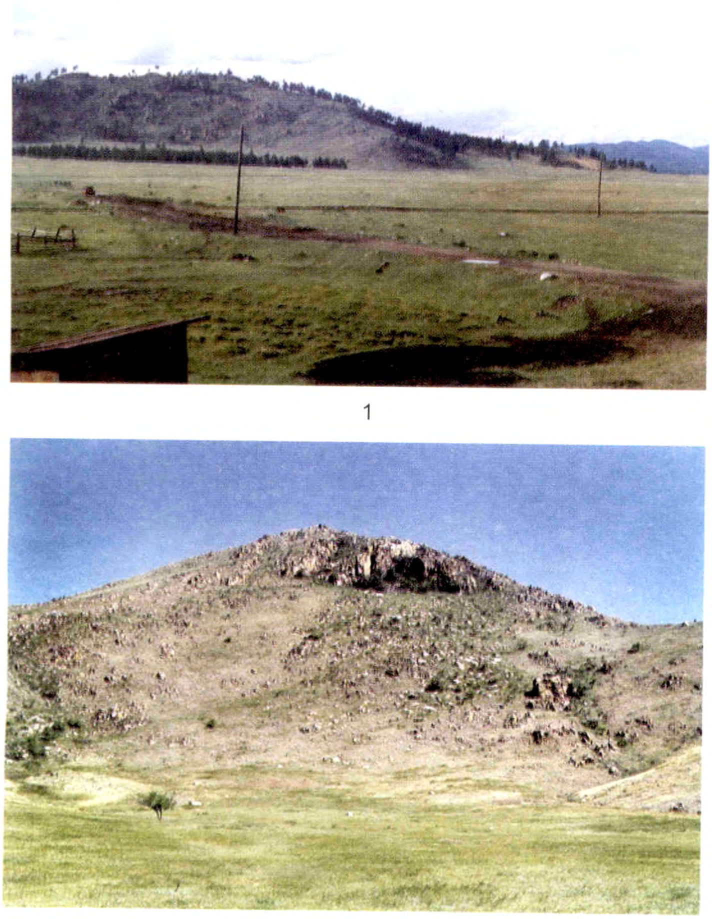
The western Trans-Baikal is situated within the contact area of two large geographical zones: the subcontinents of North and Central non-tropical Asia. This region is included in part of the Mongolian-Siberian folded region representing a wide range of environmental conditions, including various geological forms, relief, climate, and water resources as well as soil, biota, and landscape types. The central and northern parts of the western Trans-Baikal embrace the Uda-Vitim contact territory with a complex geological structure combining features typical of the boreal taiga and boreal steppe Asian ecosystems. The region under discussion is situated at the junction of the Selenge middle elevation mountain range and the Vitim plateau (Fig. 1). This territory occupies the boundary between two major geomorphological regions; its major landscape, climatic, and geomorphological features are more similar to the Selenge middle elevation montane type.

The region containing the above mentioned sites represents a dissected middle elevation mountain complex, with considerable altitude differences between the peaks and the valleys. The major orographic systems stretch northeastward, with fluvial tributaries mostly flowing to the southwest. The average altitude of the middle elevation mountains is 1000 – 2000 m above sea level. The mountains have mostly gentle slopes and comparatively low passes. The mountain ranges and plateau areas are bisected by wide, considerably deep valleys and intermontane depressions. The river valleys lie at elevations of 600 – 700 m above sea level (Buiantuyev, 1964).

The geographic setting of the area stipulates an extreme continental climate with typical fluctuations in annual and diurnal temperatures and considerable annual solar illumination. Such conditions have impacted the current relief-forming processes, especially the intensity of rock weathering, permafrost penetration, and flooding.

The geographical setting of the territory under discussion falls at the interface of two different environmental zones: the East Siberian mountain taiga and the Central Asian steppe, which results in great diversity and special types of vegetative and soil cover. This territory is also characterized by considerable diversity in environmental zones. The Trans-Baikal as a whole is characterized by a violation of the gradual succession of environmental zones typical for steppe regions.

Middle – Upper Paleolithic sites are associated with Late Quaternary subaereal deposits of hillside terraces of colluvial-alluvial genesis typical for the Uda depression (Fig. 2); such characteristics of the deposits have determined the specific methods of excavation employed. Investigations of the geological and archaeological objects imbedded in various geological sediments have been carried out with special consideration of the changes in the genesis of enclosing sediments as well as changes in the density of archaeological materials. These changes suggest an alternation in the conditions of human habitation or succession of human occupation horizons with strata representing primarily secondary concentrations of artifacts (Medvedev, Nesmeianov, 1988). The noted



1

2

Fig. 2. The southern view of Kamenka (*1*) and Khotyk (*2*).

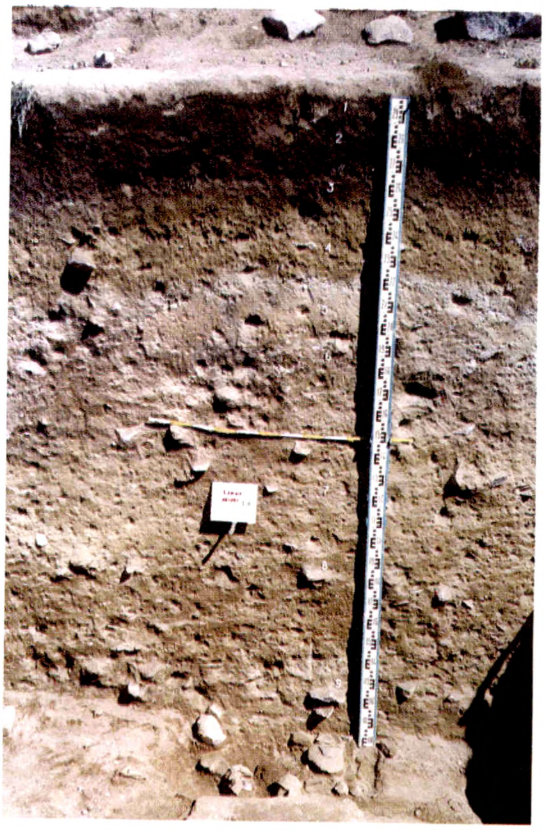


Fig. 3. Statigraphic column of the Khotyk northern profile with RTL and ^{14}C dates.

average thickness of culture-bearing deposits ranges from 3 to 5 m, in some cases reaching 10 m. Complex investigations of such sites allow us to identify diverse facies and chronostratigraphic periods of sedimentation with respect to existing climatic conditions as well as to propose a model reconstructing the environment during the period of human occupation of the site and to specify peculiarities in deposition (and redeposition) of the products of human activities (Fig. 3).

The present paper focuses on materials obtained in the course of investigations of the two geo-archaeological regions of the Uda forest-steppe area: the Brianka (Kamenka, Varvarina Gorna, Mukhor-Tala-4) and Ona (Khotyk) regions. Assemblages were recovered from those strata: (1) in which artifacts occurred *in situ* (Varvarina Gora (3), Khotyk (3 – 6), Kamenka (A), Mukhor-Tala-4); (2) in which artifacts were partially disturbed and redeposited (Varvarina Gora (1, 2), Khotyk (2), Khotogoi-Khabsagai, Kamenka (B); and (3) containing only redeposited cultural remains (Khotyk (1)). The above mentioned sites were subjected to multidisciplinary research; absolute and relative dates were generated (Lbova et al., 2000; Lbova, 2000).

Studies of continental Upper Pleistocene deposits in the western Trans-Baikal, including their interpretation and correlation with the results of Baikal region sediment cores (e.g., the "Baikal well-boring" Project carried out in the Academichesky Mountain range) have provided a considerable array of facts aiding the reconstruction of the Upper Pleistocene environment (Ravski et al., 1964; Antoshenko-Olenev, 1982; Bazarov et al., 1982; Rezanov, 1988; Grachev et al., 1997; Lbova 2000; Lbova et al., 2000).

The past decade of research at the above-named geo-archaeological sites in the Uda forest-steppe zone have proven our presupposition regarding the absence of periglacial conditions in the western Trans-Baikal during the Upper Pleistocene as well as providing additional information useful in the reconstruction of micro-climatic conditions in small valleys within the Uda basin

(Dergacheva et al., 1995; Rezanov et al., 1999; Lbova, 2000). Below are the brief characteristics of the established climatic-chronological units with which remains of Middle – Upper Paleolithic cultures were associated.

The *Kazantzevian deposits* (110,000 ± 15,000 and 148,000 ± 17,000 BP) investigated in the Uda basin comprise sediments of various origins. The corresponding deposits at the Khotyk profile revealed human cultural remains (lower levels 5 and 6). A pedocomplex containing two paleosols was established; its analysis has not yet been completed.

The *Early Zyrian deposits* include both alluvial and slope sediments. For instance, the middle portions of the Zyrian deposits (61,000 ± 7300 and 65,000 ± 6500 BP) on the Ona and Uda terraces are composed of loose, well-sorted, yellow and dark yellow sands impregnated with medium to fine-grained debris (up to 80%); large-grained gravels (5%) and clay and aleurite particles (15%) are also present. The lowermost portion of the slope deposits at Khotyk, Khotogoi-Khabsagai, and Varvarina Gora were composed of brown and yellowish-brown sandy loam saturated with debris. The deposits are intercalated with laminations of gray clay from 25 to 30 cm long. Carbonized spots were also noted. The considerable fracture of gravel and scree as well as coarse-grained debris is suggestive of active weathering and colluvial-alluvial processes (Rezanov et al., 1999). Frost-wedges were noted in the uppermost portion of this horizon.

Only small amounts of pollen and spores were recovered from the sediments of these profiles. However, a depleted spore-pollen spectrum was obtained from sediment samples from the Khotyk profile, trench 2. This spectrum revealed the pollen of herbs and grasses: Gramineae, Compositae, *Artemisia* sp., Ericaceae, and solitary seeds of *Pinus silverstis* L. This pollen profile is suggestive of open, unforested landscapes vegetated with steppe species associations. The climatic conditions may be inferred as arid and non-conducive to vegetation and spore-pollen conservation (alkaline conditions of sedimentation) (Savinova, 1999). The paleopedological analysis of the Ona region deposits suggests slow pedogenic processes in the Early Zyrian period attesting to severe climatic conditions (Vashukevich et al., 1999). The faunal remains include skeletal elements of rhinoceros, dzeren (Siberian gazelle), horse, ox, and rodents: field vole (*Lasiopodomys brandti* Radde) and marmot.

Thus, the earliest cultural horizons at Khotyk (4 – 6) are included in the Kazantsevian – Early Zyrian deposits. This classification is based on data from palynological, lithological, and paleopedological analyses as well as on available RTL dates (Table 1) (Rezanov et al., 1999; Savinova, 1999; Vashukevich et al., 1999; Lbova, 2000). The paucity of available Middle Paleolithic data in Siberia and Central Asia hampers correlation. The closest analogues in geological position to the localities under discussion are the Altai sites of Kara-Bom, Ust-Karakol-1 (strata 13 – 19), Denisova Cave (strata 12 – 21), and the Mongolian site, Tsagaan Agui Cave, the lowermost portion of sedimentation unit 3 (Derevianko, Petrin, Rybin, Chevalkov, 1998; Derevianko, 2001).

The *Karginian deposits* in the western Trans-Baikal have been the most thoroughly analyzed deposits due to the execution of a wide spectrum of geo-archaeological investigations. The majority of the Paleolithic sites in the Trans-Baikal are associated with the Karginian period of the Upper Paleolithic. The Karginian culture-bearing horizons reveal various origins. The Selenge middle mountain range reveals alluvial deposits of the third terrace of the Selenge and its tributaries. This sedimentation cycle began during the early Zyrian period and finished during the second half of the Karginian interglacial The early alluvial deposits of the second Uda terrace were formed simultaneously with the final accumulation of the third terrace alluvium (33,000 ± 6600 BP) (Bazarov et al., 1982; Vasiliev et al., 1993, Lbova et al., 2000). The climatic conditions of the Karginian interglacial proved to be relatively warm. Features indicative of drier and cooler conditions mark the end of this period. The Karginian deposits are characterized by a high carbonaceous fraction. The pedogenic data obtained from archaeological profiles in the Ona basin allow their subdivision into two parts. The lower portion of the Karginian sedimentation sequence shows a layer of dense loam saturated with debris. This layer demonstrates a fractured texture; lenses of coarse-grained sand were encountered. Investigations of subaerial deposits of the first half of the Karginian interstadial have not been completed, thus we are not yet able to draw final conclusions about the chronometric affiliation of these strata. Nevertheless, this part of the deposition sequence seems to have originated during the Early Karginian or the final Early Zyrian (Ermakovian) period (Rezanov et al., 1999) These sediments are intercalated with clay laminations and soil derivatives exhibiting dark coloration. The organic carbon content reaches a level of 0.3%, which is higher than that of the Early Zyrian deposits; while the carbon content of the soil derivatives is even higher, reaching 0.4 – 0.5%, the proportion of C_{ha} to C_{fa} (the ratio of the carbon content in the humic acids to the carbon content in the fulvic acids) is 0.24 – 0.27. The carbonate content is comparatively low, while the content of exchangeable Ca^{2+} and Mg^{2+} is slightly higher. The level of pH_{H2O} is consistently high (8.8 – 8.9) (Vashukevich et al., 1999).

The upper portion of the Karginian sedimentation sequence has been identified at all archaeological sites in the Ona basin. Its characteristic features are typical for most initial Upper Paleolithic sites in the Trans-Baikal

Table 1. ^{14}C and RTL-dates for Paleolithic sites of the Uda River basin

Site	Stratum, technocomplex	Date, years BP	Laboratory code
Varvarina Gora	1	17,050 ± 400	SO AN-3053
	2	29,895 ± 1790	SO AN-3054
		30,600 ± 500	SO AN-850
		34,900 ± 780	SO AN-1524
		34,050	AA-8875
		35,300	AA-8893
Kamenka	A, C	26,760 ± 265	SO AN-3353
		30,220 ± 270	SO AN-3354
		30,460 ± 430	SO AN-3133
		31,060 ± 530	SO AN-3052
		35,845 ± 695	SO AN-2904
		40,500 ± 3800	AA-26743
	B	24,625 ± 190	SO AN-3031
		25,540 ± 300	SO AN-3355
		28,000 ± 475	SO AN-2903
		28,060 ± 475	SO AN-2903
		28,815 ± 150	SO AN-3032
Khotyk	1	22,000 ± 2500	GI SO RAN N 242
	2	26,000 ± 3000	GI SO RAN N 241
		26,220 ± 550	AA-32669
		27,000 ± 3000	GI SO RAN N 245
		32,000 ± 4600	GI SO RAN N 155
		45,000 ± 6800*	GI SO RAN N 243
		49,000 ± 7000*	GI SO RAN N 153
		56,000 ± 4000*	GI SO RAN N 153
	3	34,000 ± 6000	GI SO RAN N 244
	4	63,000 ± 9500	GI SO RAN N 235
		65,000 ± 8000	GI SO RAN N 246
	5	70,000 ± 13,000	GI SO RAN N 236
		85,000 ± 9000	GI SO RAN N 239
		91,000 ± 3000	GI SO RAN N 157
		98,000 ± 12,000	GI SO RAN N 237
Khotogoi-Khabsagal	2	25,000 ± 4300	GI SO RAN N 234
	3	46,000 ± 6500	GI SO RAN N 229
		55,000 ± 8300	GI SO RAN N 232
		64,000 ± 7600	GI SO RAN N 321
	4	120,000 ± 11,000	GI SO RAN N 154
		190,000 ± 25,000	GI SO RAN N 158

*Contamination with ancient quartz is possible

(e.g., Varvarina Gora (2), Tolbaga, Kamenka (B), Podzvonkaya). Both analytical facts and visual observations revealed a higher content of humus. Also, a considerable increase in the carbonate content reaching 10% was noted. Humus in this portion of the profile is of humate-fulvic composition, the proportion of C_{ha} to C_{fa} is close to 1:1. The upper Karginian sediments yielded a higher optical coefficient and a lesser index of magnetic susceptibility. A layer of buried soil, which was formed under considerably warmer, relatively dry conditions, was noted in association with this stratigraphic unit. This fact is suggestive of the pedogenic transformation of this stratum (Dergacheva et al., 1995; Lbova, Savinova, Vashukevich, 1999; Vashukevich et al., 1999)

Sporo-pollen data have revealed the following major types of Karginian vegetation in the Trans-Baikal: forest-steppe associations dominated by birch (24 to 75%) and pine-larch forests (*Pinus* represents 14 to 66% of the samples). The forest-steppe environment is characterized by light coniferous forests with a sparse growth of trees. The available pollen spectra also show a minor admixture of broad-leafed taxa including hazelnut, oak, beech, and elm as well as a rich variety of herbs and grasses. The forest-steppe ecosystem occurred along with the steppe environment characterized by mesoxerophytic grassy communities (Rezanov, 1988). The sporo-pollen data collected from the entire Ona basin indicate that during the Karginian period, the area was dominated by light coniferous forests with Ericaceae in the undergrowth, but dense patches of coniferous forest also occurred. Intermontane depressions were vegetated with birch and willow forests. The Ona region sporo-pollen spectra also revealed pollen of various herbs and grasses as well as mosses and lichens. The sunny slopes were vegetated by alder trees. Climatic conditions may be reconstructed as wet and relatively warm (Savinova, 1999; Lbova et al., 2000).

The Karginian portion of the Ona and Brianka stratigraphic sequences is composed of loessic loam and sand and dates to 25 – 60 ka ago. These dates, which were generated from particular sites, conform to the noted chronometry of the sediments and are regarded as reliable.

The upper and lower portions of the Karginian pedocomplex correspond to different chronometric periods (the Malokhetian and Lipovsky-Novoselovsky periods). The lithological layers bearing more ancient cultural materials (Kamenka (A, C), Varvarina Gora (3), Khotyk (3)) underlie the layer of the Late Karginian soil formation. This paleosol layer was mostly destroyed by solifluction occurring during the Sartan. The culture-bearing horizons are associated with layers of humic soil, from 2 to 4 cm thick; this fact suggests warmer climatic conditions in comparison to those occurring during the accumulation of the overlying stratum (Dergacheva et al., 1995; Vashukevich et al., 1999). Variable humidity may be explained by micro-climatic conditions in particular areas, the same as is noted nowadays. The lower portion of the Karginian deposits is dated to 30 – 45 ka BP (see Table 1).

The initial Upper Paleolithic sites of Varvarina Gora (2), Khotyk (2), and Kamenka (B) reveal a common geological feature. cryogenic disturbances in the form of ice wedges in the Late Karginian deposits bearing cultural remains. Also, traces of soil out-wash were noted within strata attributed to the initial Sartan. These deposits are dated to the interval of 25 – 35 ka BP (see Table 1).

A number of sites dating from 26 – 28 to 35 ka ago have been discovered in Siberia. They exhibit similar stratigraphic positioning and have been attributed to the Initial Upper Paleolithic (Abramova, 1989; Stratigrafia..., 1990; Drozdov, 1992; Derevianko, Markin, Vasiliev, 1994; Konstantinov, 1994; Derevianko, Kholiushkin, Rostovtsev, Voronin, 1998; etc.).

The collection of faunal remains includes bones of the following large mammalian taxa· *Coelodonta antiquitatus, Bison priscus, Equus caballus, Equus (Hemionus) hemionus, Megaloceros giganteus, Spiroceros kiakthensis, Poephagus baikalensis, Procapra (Gazella) gutturosa,* and *Ovis ammon*, among others (Ovodov, 1987; Germonpre, Lbova, 1996; Kalmykov, 1999). The collection of rodent bones includes the following taxa: field vole (*Lasiopodomys brandti* Raddle), marmot (*Marmota sibirica*), hare (*Lepus* cf. *L. tolai*), ground squirrel (*Spermophilus undulatus*), lemming (*Lagurus lagurus*), and *Meriones unguiculatus*. A combination of steppe and forest species in the Paleolithic faunal communities may be explained by the mosaic character of ecosystems existing both in prehistory and at present. During the Karginian period, local microclimatic conditions may have varied by locality in the same way as has been noted currently

The general tendency towards cooling and aridification of the climate during the late Karginian period has been noted by all researchers. This tendency resulted in the alteration of the environment in the Sartan period (from 25 – 22 till 12 – 10 ka BP). Initially, the climate was cool and dry, then it changed to relatively cold and wet conditions, and prior to 14 ka ago, the climate was moderately warm and relatively dry. These general paleogeographical features typical of the Sartan resemble conditions obtained during the early Zyrian time as well (Lbova et al., 2000).

The analysis of raw materials with respect to chronometric attributions of the established Uda technocomplexes revealed distinct preferences in lithic raw material selection, with particular rock types being preferred during different chronometric periods. The geological composition of the area under study includes various types of volcanogenic, volcanogenic-sedimentary and intrusive rocks of various compositions and ages. Thus, artifacts recovered from the chronometrically earlier sites of Khotyk (3, 4), Kamenka (A), Varvarina Gora (3) were mostly made on effusive rocks: tufa with varying siliceous content (more than 75%). Solitary specimens within these collections were made on basalt, acidic effusive tufa, trachytic-ryolitic porphyry, microquartzite, quartz, chalcedony, and marl (from 0.1 to 10%). The collections which we attribute to later

Table 2. Technical-typological indices of "transitional" industries of the Uda forest-steppe zone

Site	Stratum, technocomplex	IL_{tech}	IL_{typ}	IF_{str}	I_{lam}	IR	I M	I UP
Kamenka	A	–	2.4	41.4	44.2	0.2	13	23.2
	B	0.9	1.3	12.8	6.6	7.1	9.9	48.4
Varvarina Gora	2	1.4	3.8	20.1	41.9	11	19.3	24.4
Khotyk	1	–	–	25	57	21	–	29
	2	2.3	4.5	41	40	16	18.7	15
	3	4.1	7.5	35.4	44.6	8.6	22.2	8.6
	4*	16.9	29.2	34.6	3.5	–	23.1	–

*Collection of the year 2000

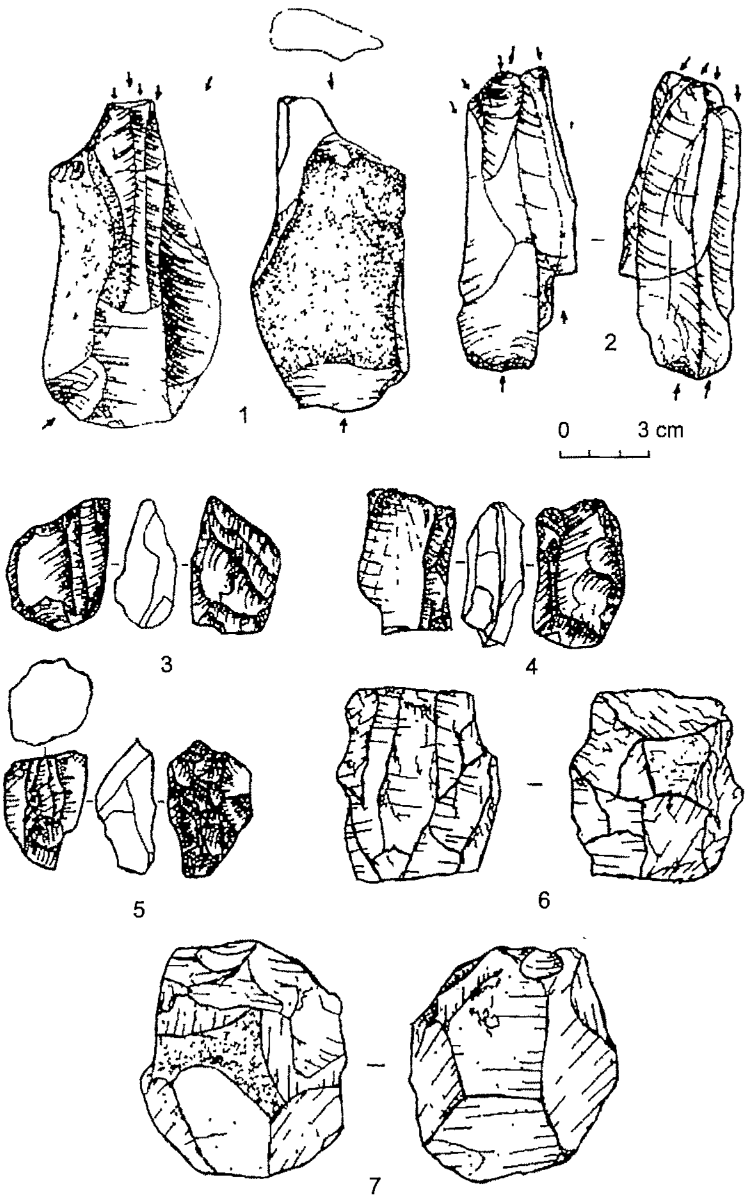


Fig 4 Cores. Kamenka.
1 – 3, 5 – complex A, *4, 6, 7* – complex B

chronometric periods – Khotyk (2), Varvarina Gora (2), and Kamenka (B) – display a notably different distribution of artifacts by raw material. The fraction of trachytic-ryolitic porphyry increases (from 24 to 50%), the same tendency can be seen in basalt (to 29%); while the percentage of tufa decreases to 35%. At Mukhor-Tala, artifacts were mostly made of siliceous tufa (up to 99%). Solitary artifacts in all the collections discussed here were made on rock crystal, chalcedony, and smoky quartz due to the local availability of these rocks in the valleys of the small tributaries of the Uda (Kuznetsova, 1999; Lbova, 2000).

Technical-typological characteristics of industrial complexes

The sites located within the Brianka and Ona basins have been classified as seasonal and long-term camps where the whole process of stone working took place (Kamenka, Varvarina Gora, and Khotyk), and a workshop site (Mukhor-Tala). These sites are important for the Trans-Baikal region because they are well investigated and demonstrate a variety of techniques utilized for tool production.

Primary reduction strategy is illustrated by the recovery of preforms and cores of various types, and core-fragments (Fig. 4; 5, *7 – 10*; 6; 7, *4, 11, 12*) as well as by-products including crested blades, spalls resulting from platform surface rejuvenation, and the spalls of core treatment. The percentages of these major types vary by site, but are included in all the collections under discussion. Nuclei are dominated by parallel blade cores bearing one or two striking platforms. Most of these cores have only one flaking surface; this set includes tabular, prismatic, and sub-prismatic varieties bearing negative scars of alternate flaking executed from opposing striking platforms.

Discoidal and polyhedral cores are uncommon in the Uda collections. Thus, in the Upper Paleolithic technocomplexes from Varvarina Gora (2), Khotyk (2), and Kamenka (B), such nuclei comprise from 6 to 11% of the total number of cores recovered (see Fig. 5, *9*; 6, *1, 4, 6, 7*). To the contrary, cores of this type dominate the collection from the Middle Paleolithic Khotyk (4) technocomplex (Fig. 8, *1*).

The occurrence of Levallois-like blades, flakes, and point cores in the Varvarina Gora (stratum 2) collections is noteworthy: 7.8%, as are similar discoveries from Khotyk: the collection from stratum 2: 4 5%; stratum 3: 9.1%; and stratum 4: 20%. Most of these Levallois nuclei are ovoid and have convex flaking surfaces and beveled striking platforms Levallois-like cores are also recorded in the Tolbaga collection (3.1%) and from surface collections from Sapun-Gora (6 6%).

The earliest occurrence of so-called "narrow-face" cores is recorded in the collections from Khotyk (2), Varvarina Gora (2), and Kamenka (A) (see Fig. 4, *3 – 5*; 6, *5*). Despite the paucity of such cores (from 1 to 3 specimens in each collection), the fact that the narrow-

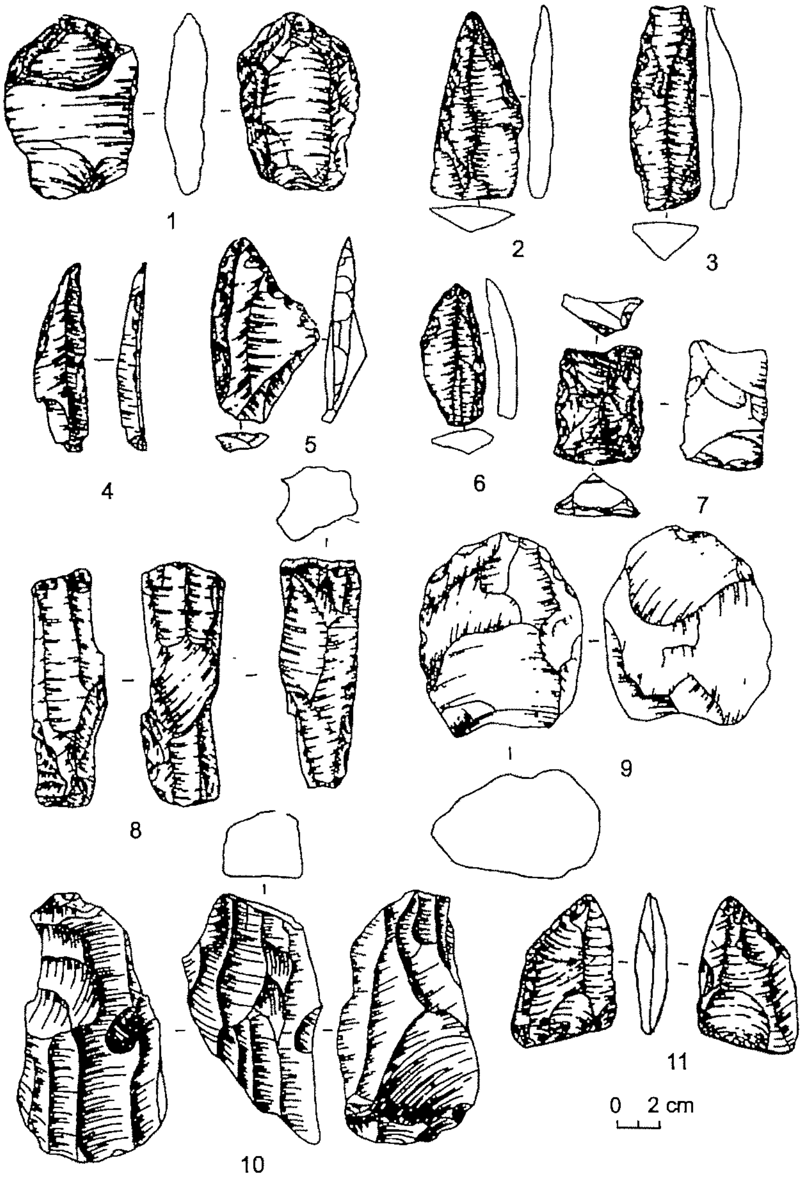


Fig 5 Lithic artifacts. Varvarina Gora.
7 – 10 – cores, *1, 3, 5 – racloirs*, *2, 4, 6* – points, *11* – *déjéte* tool

face flaking technique was practiced at such an early period (around 30 – 40 ka ago) is noteworthy. Microcores were noted in all the collections discussed here. We think that their presence is the result of a variety of processes. In our opinion, a large number of the microcores from Kamenka complex A may be explained as the result of a raw material deficit, since all such cores are completely exhausted; while the Kamenka complex B and industries of the final Upper Paleolithic provide evidence of a technological process aimed at the intentional production of such microcores.

Between 2.3 to 3.7% of the industries attributed to the "transitional" period consist of nuclei of various types, which is quite close to the percentage of cores identified within initial Upper Paleolithic collections in the Trans-Baikal region (Konstantinov, 1994).

Analyses of characteristic features of cores and their by-products indicate that archaeological collections from the Brianka and Ona regions include two major technological traditions. First, a tradition of laminar flaking is apparent within collections from Varvarina Gora, Kamenka (A), and Khotyk (2, 3) The percentage of blade cores (including parallel nuclei, tabular cores with single and double platforms, sub-prismatic, and "narrow-face" cores) ranges from 60 to 70% of the total number of cores identified within the collections. Laminar flakes constitute 41.9, 44.2, and 40 – 44.6% within the relevant categories respectively. The collections from Kamenka (A) and Khotyk (2, 3) comprise from 68 to 85.5% of laminar blanks utilized for tool production (Lbova, 2000). A similar picture is revealed in the Tolbaga collection (Konstantinov, 1994). On the other hand, only 9.6 to 28.8% of tools were fashioned on flakes and pebbles

Thus, the collections discussed here may be referred to as "blade-based industries". These industries include artifacts illustrating sequential stages of stone flaking, suggesting that the major aim was to detach as many blades from a single core as possible (Giria, 1997), and the cores are processed until their complete exhaustion.

The Khotyk (4), Kamenka (B), and Mukhor-Tala-4 collections illustrate a very different technological tradition, the major characteristics of which include: a combination of Levallois technology, the citron technique, and radial, polyhedral, and irregular flaking in core reduction; a small number of tools fashioned on blades and blade fragments; and products of micro-flaking (proto-wedge-shaped cores and micro-blades in Kamenka complex B) (see Fig. 4, *4, 6, 7*; 8). This industry demonstrates features different from those noted in the laminar industries: namely the dominance of flakes over the by-products (67.5% in Kamenka (B); 58 9% in Mukhor-Tala-4), and different methods of secondary stone working. The closest analogue may be found within the Kunalei stratum 3 technocomplex (Konstantinov, 1975, 1994; Bazarov et al., 1982). The collections from strata 3 – 5 at the Sannyi Mys site and the later collections from Mykhor-Tala demonstrate certain developmental features of this tradition The Kamenka (B) and Kunalei (3) collections bear similar technological characteristics: a series of so-called polyhedral cores including the cubic and discoid varieties constitutes more than half of the total number of nuclei recovered. The category of cores also includes wedge-shaped varieties and nuclei, from which flaking has been executed from their narrow margins (narrow-face cores), and the blanks for such cores as well as nuclei bearing Levallois features. The Kamenka (B) and Kunalei collections also exhibit typological similarities. The tools were mostly made on flakes (72 – 74%); only from 9 to 10 % of tools were fashioned on blades; the share of pebble tools ranges from 15 to 18%. These features prove the technical-morphological similarity of these two technocomplexes and their affiliation to a common tradition different from that of the blade-based industries described above.

Technological analyses of striking platforms revealed high indices of faceting, which constitutes a major characteristic feature of all blank types within the "transitional" collections. The Kamenka (A) and Khotyk (2, 3) technology is characterized by striking platforms which were faceted to make them convex (Table 2). The fine faceting index (IF_{str}) allows the correlation of these technocomplexes with Mousterian sites in the Altai (Shunkov, 1990) and with the Makarovo-4 and Arembovsky industries in the eastern Baikal area (Escatenaire-Sitlivy, Sitlivy, 1996). The later complexes of Varvarina Gora (stratum 2) and Khotyk (stratum 1) yielded considerably lower faceting indices (in the range of 20 – 25), while the Upper Paleolithic collections from Sanny Mys and Kamenka (B) yielded still lower faceting indices (13 – 16).

The metric analysis of the Kamenka (A) and the Khotyk (3) complexes shows a predominance of elongated blanks; the collections from Varvarina Gora (2) and Khotyk (2) are dominated by medium-long and elongated blanks together with the occurrence of very large blades; the Khotyk (4) collection shows considerable similarity with the Kamenka (B) complex in its stressed utilization of short blanks.

The tool kit. The dominant methods of secondary working include retouching on the dorsal and ventral surfaces of implements; burin spall detachment; hewing, and serration. Also, trimming, notching, and fragmenting were practiced. The blade-based collections include from 22.5 to 29.8% of tools, while the flake-based assemblages revealed half as many tools.

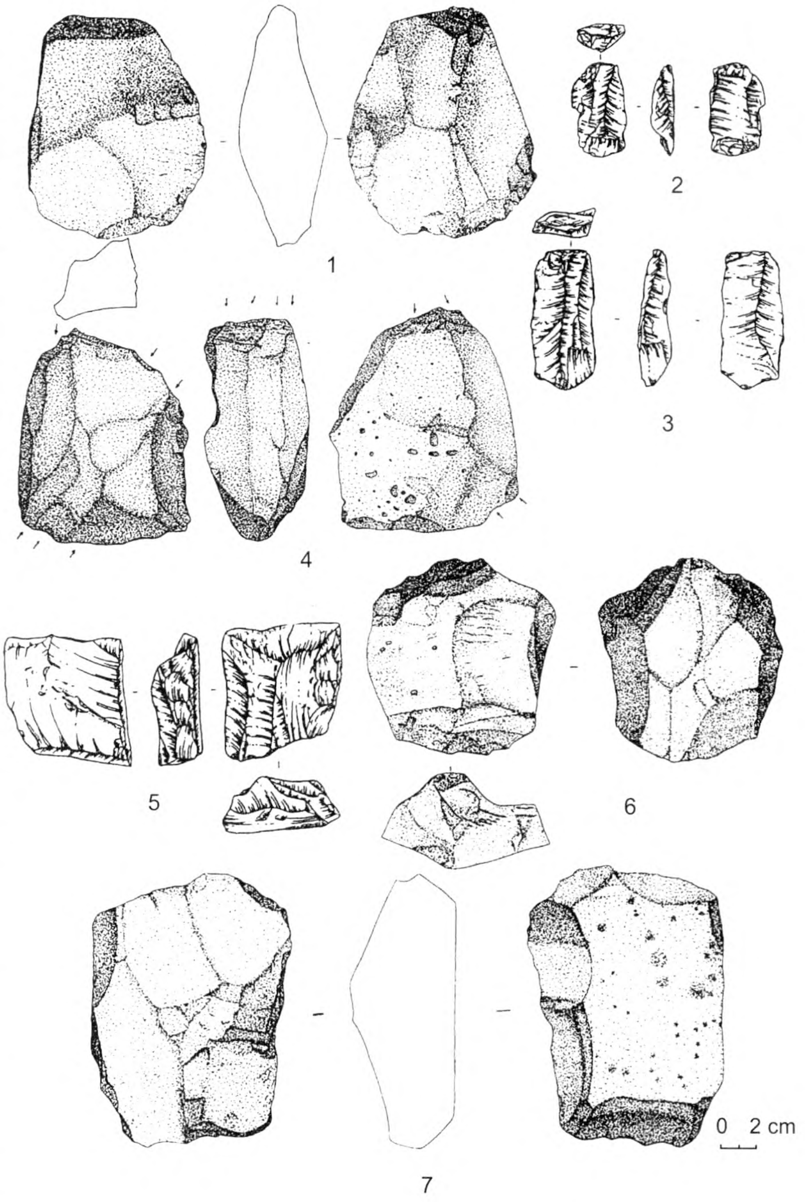


Fig. 6. Cores. Khotyk (stratum 2).

The Uda Upper Paleolithic technocomplexes comprise from 15 to 19 tool types. The category of knives includes various types, such as those with single and double cutting edges and backed knives. The following tool categories were also identified: points, *racloirs* of various modifications, notched and denticulate tools, carinated *racloir*-like pieces, borers, and chisel-like tools (see Fig. 5, *1 – 6*; 7, *1 – 3*, *5 – 10*, *13*, *14*; 9; 10; 11). The Kamenka (B) and Sanny Mys (strata 3 – 5) collections include micro-*grattoirs*. Varvarina Gora, Kamenka (A) and Khotyk (2) yielded the richest collections including the most diverse tool kits. The tool kit identified within the collection from Khotyk (4) is dated to the period prior to

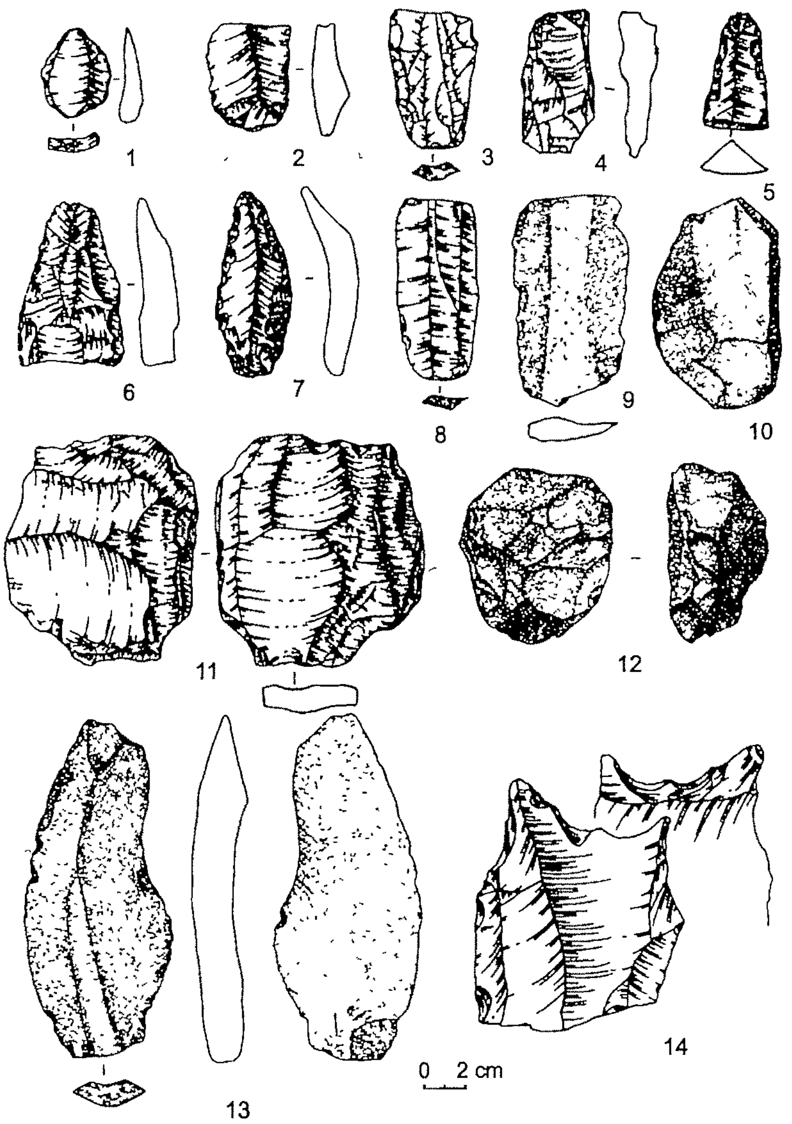


Fig 7. Lithic artifacts. Khotyk (stratum 3)
1, 3, 7, 10 – *racloir*-like forms, *2, 5, 8, 9* – blades with discontinuous retouch, *4, 11, 12* – cores; *6* – point, *13* – knife; *14* – borer

the Upper Paleolithic and yielded multifunctional, beaked, and denticulate tools (see Fig. 8, *3*, *4*).

The homogeneity noted in the morphological types identified within the blade-based complexes suggests they are synchronic or else they share a common origin. However, comparative analysis has established apparently individual features of the Kamenka (B) and Khotyk (4) complexes.

The technological peculiarities of the Kamenka (A) and Khotyk (3) collections reveal many common features. Both collections include points, notch-denticulate tools, retouched blades, and backed knives. The industries of Kamenka (A) and Khotyk (3) are characterized by the same proportionate representation of specific tool types (including scrapers, burins, and pebble tools) although their absolute numbers are not identical This fact suggests cultural homogeneity and contemporaneity of these technocomplexes, or similar functional attribution of the excavated portions of these prehistoric sites. For more precise and detailed attribution of these sites, additional excavations and subsequent research are necessary.

Conclusions

The classification of the sites presented in this paper is based on specific technical-typological features of the relevant collections as well as on the chrono-stratigraphic position of the artifacts and available dates. We believe these technocomplexes reflect particular stages in the development of Paleolithic human culture.

Technological analyses of the Middle Paleolithic industries of the Khotyk (4 – 6) type are still ongoing. However, their characteristic features have been preliminarily established and suggest the existence of some local basis for the future development of both Upper Paleolithic laminar technologies and other techniques, which developed into the Upper Paleolithic industries of the Kunalei and Kamenka (B) type. The "transitional" and Upper Paleolithic laminar complexes bear witness to a continuous developmental trajectory.

During the 2001field season, new strata (5 and 6) at Khotyk were exposed. The materials recovered are currently under analysis, allowing their preliminary attribution to the laminar industrial type. However, these collections also include a considerable number of pebble tools, such as so-called chopper-chopping tools, "nosed" tools, and hammerstones.

The artifact collection recovered in association with stratum 4 was attributed to the Middle Paleolithic and yielded a non-blade-based industry, whose major characteristic features include a radial, Levallois-like reduction strategy, the absence of products of prismatic flaking, and tools whose typology may be attributed to the Upper Paleolithic. The few tool types noted include *racloirs*, denticulate tools, and beak-shaped tools fashioned on large flakes (or laminar flakes). It should be noted that most tools exhibit traces of multifunctional use. This industry was preliminarily regarded as non-blade-based, with a considerable admixture of denticulate tools.

Technical indices generated on the collection assembled by 2000 are as follows: $IL_{tech}=16.9$; $IL_{typ}=29.2$; $IF_{str}=34.6$; $I_{lam}=3.5$; Mousterian index=23.1. Note that the later index is slightly higher than the typical Mousterian index for "transitional" industries. The available data do not allow the clear identification of the cultural context of this site. Similar technical methods have been recorded at other Middle Paleolithic sites including Orkhon-1 and 7 in Mongolia (Derevianko, 2001) and at Priiskovy (Karasev, Kolosov, Krushevski, 1996). Any more precise correlations cannot at present be established. However, judging from the features of cores and blanks, the Khotyk variant of the Middle Paleolithic industry can be described as non-blade-based

The apparent elements of the Levallois tradition of stone reduction and the development of dominant laminar techniques represent characteristic features of "transitional" Paleolithic industries in the Trans-Baikal The technical indices reflecting the use of Levallois technology within the "transitional" industries generally do not exceed 8%. However, Levallois technical elements were noted within all the collections assembled from sites in the Uda basin and from the western Trans-Baikal in general. Levallois elements were noted in the "tortoise" cores and flakes, blades, and points detached from such cores; tabular cores regarded as the result of the "recurrent" technique of utilization as well as in faceted striking platforms of the *chapeau de gendarme* type.

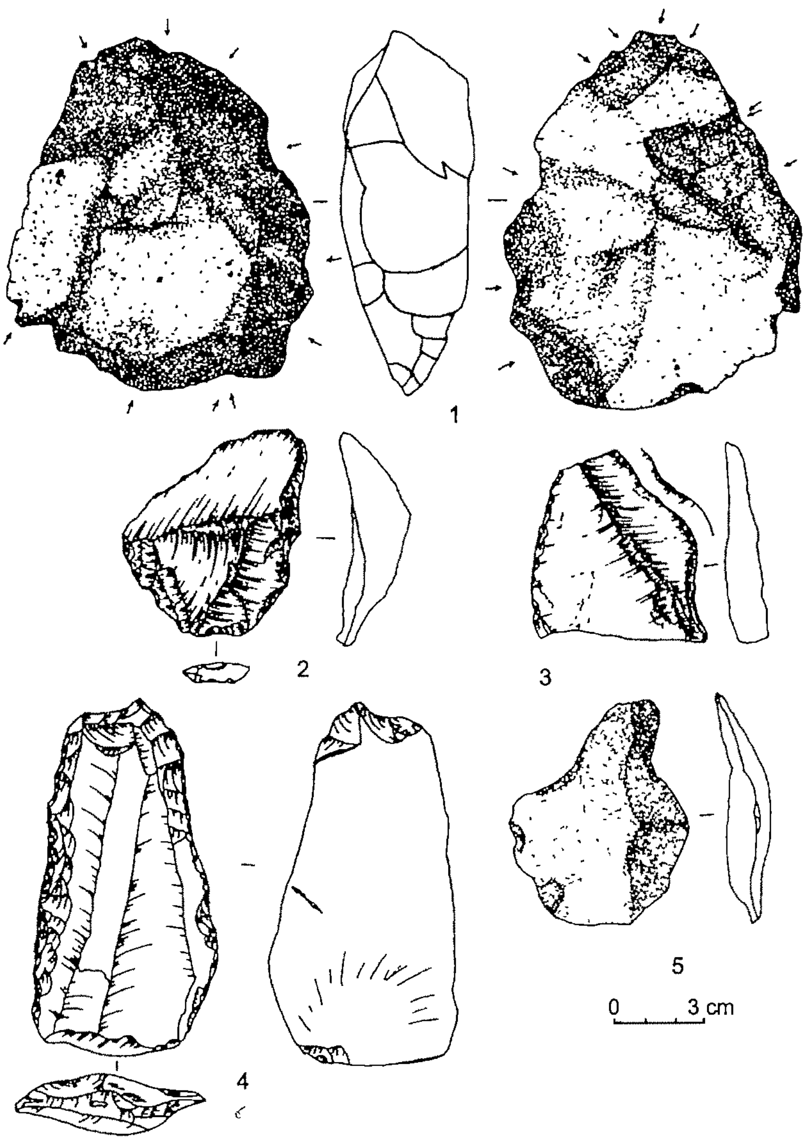


Fig 8 Lithic artifacts. Khotyk (stratum 4).
1 – core, *2, 3, 5* – flakes, *4* – blade

Together with the blade-based tradition, another developmental trajectory has been established comprising such characteristic features as irregular core reduction strategy leading to the creation of several platforms and flaking surfaces on a single core and the fashioning of tools on flakes.

The tool kits recovered from all the sites in the region under study comprise a Mousterian series of tools including *racloirs*, points, and backed knives (from 9.9 to 22.2%); notch-denticulate tools; and an increased series of Upper Paleolithic tools (e g., *grattoirs*, chisels, burins, and borers: their share in different collections constitutes from 8 6 to 48.4%). We believe this tendency developed over a period of 20 – 25 thousand years. The collections associated with later periods yielded the lowest Mousterian and the highest Upper Paleolithic technical indices. All the collections revealed pebble tools; their percentage varies from 3 – 5 % within the blade-based industries to 15 – 18% within the other series.

A collection of bone and horn artifacts includes implements of modified shape and those exhibiting solitary engravings or a series of incisions and cut marks (Lbova, 2000). Bone implements with incisions and cut marks are reported from many European sites attributed to the final Mousterian – Initial Upper Paleolithic, although their interpretation is still debatable. These objects probably demonstrate early geometric pattern decorations, or perhaps early forms of counting, the transmission of information, etc. In any case, these objects apparently exhibit intentional symbolic representations of abstract human thought. Adornments and objects

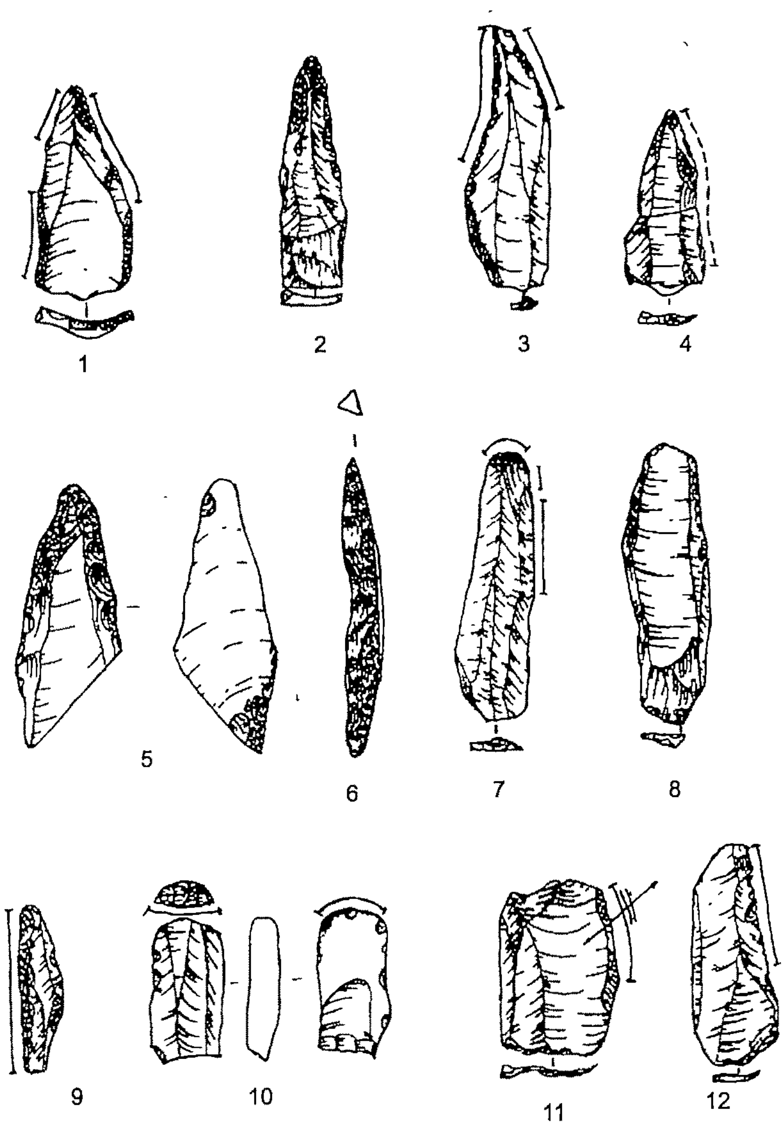


Fig 9 Lithic artifacts. Kamenka (A).
1 – 6 – points, *7, 10 – grattoirs*, *8, 9, 11, 12* – knives

bearing regular incisions, cut marks, ocher spots, etc., that do not imply any utilitarian purpose are reported from a number of sites of the "transitional" period in Europe and southwestern Asia (Stoliar, 1985; Lejeune, 1987). The occurrence of objects of this sort within the collections from Kamenka (A), Khotyk (2, 3), Tolbaga, and Podzvonkaya supports the proposed chronometric and cultural correlations.

The Kamenka (A), Khotyk (3), and Varvarina Gora (3) technocomplexes have been identified as the earliest among all the sites under study on the basis of available stratigraphic data, paleopedological features, and radiocarbon dates (from 30 to 45 ka ago). Petrographic analysis has also shown differences in the selection of raw material between these complexes and later Paleolithic collections. The second class comprises the technocomplexes from Varvarina Gora (2) and Khotyk (2). These sites may be correlated with the Tolbaga (Konstantinov, 1994) and Podzvonkaya sites (Tashak, 1996, 2000) on the basis of established technical-typological and morphological features, structural organization of the sites, and climatic-stratigraphic features. V.I. Tashak argued that the Podzvonkaya site represents a sequence of culture-bearing horizons as does Khotyk. However, the materials obtained from the Podzvonkaya site have not been published in full, thus preventing us from attempting precise correlations. Other collections with analogous features may be enumerated: (1) in the Altai: the Kara Bom collections recovered from occupation horizons 4, 5 and 6; the Kara-Tenesh assemblages; the collections recovered from Strashanaya Cave (strata 6 and 7), Denisova Cave (strata 9 – 11); and (2) collections from the Arembovsky and Makarovo-4 sites in the Angara River basin. A considerable number of sites yielding blade-based industries with various tool forms have also been reported from Mongolia and China (Derevianko, 2001).

The consequent subdivision of the Upper Paleolithic is characterized by distinctly different technologies: large spalls were produced through direct percussion while blades and microblades, forming the basis of the industry, were produced through pressure flaking. Still later Upper Paleolithic complexes characterized by micro-tools and a variety of Upper Paleolithic tool types (e.g., Sanny Mys (strata 6 and 7), Khotyk (1), and Varvarina Gora (1)) illustrate the subsequent stage in the development of laminar industries.

Discussion

The primary reduction strategy noted in the Uda region collections attributable to the "transitional" and Initial Upper Paleolithic periods is characterized by a combination of the Levallois tradition (flaking surface preparation in particular) and specific transitional (parallel flaking pattern transitioning into flaking from the narrow faces of cores) and Upper Paleolithic features (narrow-face and proto-wedge-shaped nuclei).

Within the Trans-Baikal Paleolithic, there are two notions of the Levallois tradition: "Levallois" in the broad sense and in a more restricted sense (Okladnikov, Kirillov, 1980; Okladnikov, 1981; Konstantinov, 1994; Lbova, 2000). Research on the Trans-Baikal Middle to Upper Paleolithic transitional period involves methodical approaches to the definition of "Levallois technology" as well as theoretical assumptions about the geographical specificity and chronological character of the development of local Paleolithic cultures.

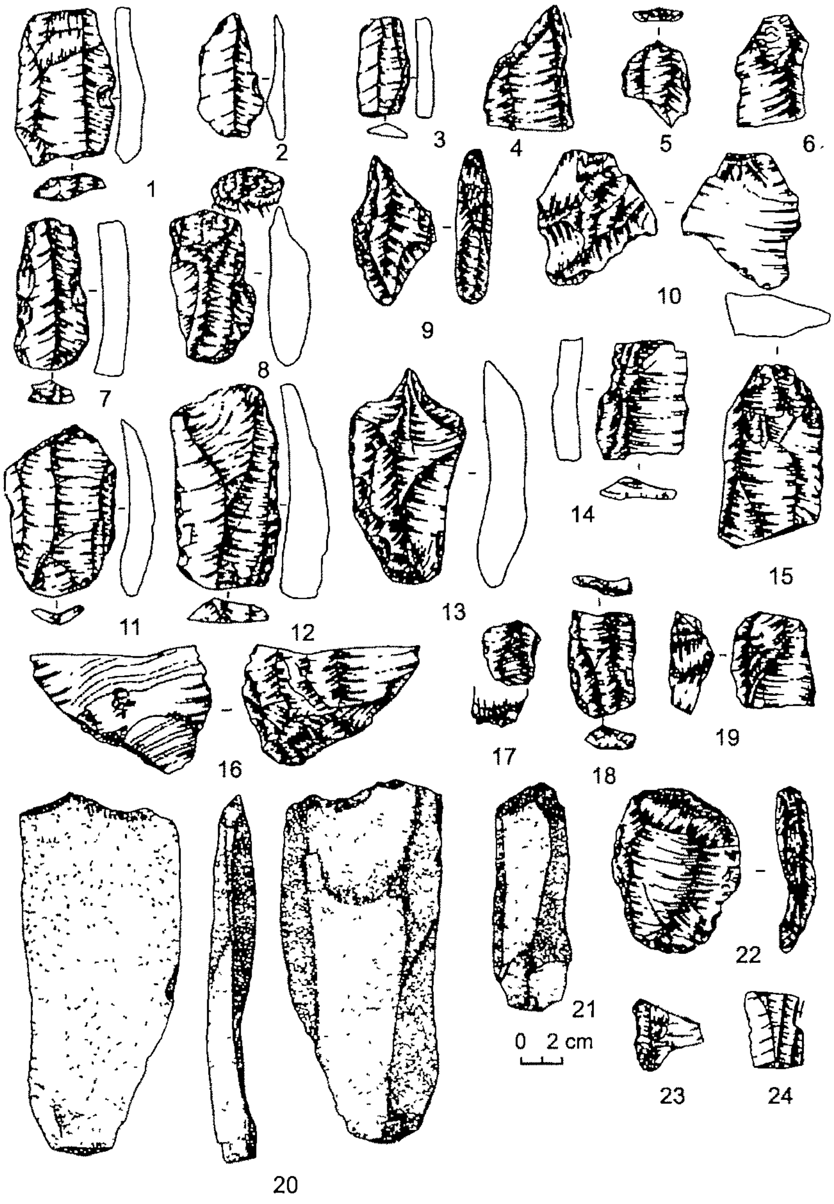


Fig 10. Lithic tools. Khotyk (stratum 2).
1 – notched tool, *2, 7, 11, 22* – knives, *3, 12, 15, 18, 19, 23* – *racloirs*, *4, 24* – burins, *5, 9, 13* – borers, *6, 14* – notch-denticulate tools, *8, 17* – chisels, *10, 16* – technical spalls, *20* – adze, *21* – blade showing use-wear signs.

On the basis of technical-typological analysis of archaeological materials from sites located in the Arts Bogd Uul mountain range in the southeastern Gobi Altai, in the Orkhon River basin, in the Trans-Baikal region and the Russian Altai, A.P. Okladnikov established "the Levallois complex of archaeological sites in Siberia, Mongolia, and North China", a construct which is not identical to "classical Levallois technology and typology in the West" (Okladnikov, 1981: 104). He included the following Trans-Baikalian sites in this complex: Sanny Mys (apparently the collection from the lower levels 6 and 7), Sokhatino, and Varvarina Gora, regarding the latter locality as the "standard site of the Levallois Paleolithic in the Trans-Baikal region" (Okladnikov, Kirillov, 1980: 57; Vasilievsky, 1983). Siberian Levallois technology (identified on the basis of Trans-Baikalian and Siberian materials) "forms a chronometric unit corresponding to the final Mousterian – Initial Upper Paleolithic" (Okladnikov, 1981: 108 – 109). Okladnikov concluded: "This culture evolved on the basis of… a trend that may be referred to as Levallois. This trend is characterized by the presence of cores and large blades of what we have called the Levallois type, associated with pebble and chopper-like cores" (Ibid.: 114).

I.I. Kirillov agreed with Okladnikov's statement with regard to the combination of a pebble tradition and Levallois features, which are considered dominant within the lithic industry of the Trans-Baikal; the Levallois cores gradually being transformed into prismatic varieties (Kirillov, 1987). He regarded sub-prismatic nuclei, which he classified as "epi-Levallois", as transitional to narrow-face cores (Okladnikov, Kirillov, 1980: 54).

Z.A. Abramova, in her review of the Paleolithic of North Asia, argued the correctness of identification of Trans-Baikalian materials as "Siberian Levallois" as well as their attribution to the Levallois-Mousterian (Abramova, 1989).

M.V. Konstantinov focused his work in the 1970s and early 1980s on the analysis of certain Levallois features noted within the Tolbaga blade-based complex (Konstantinov, 1973, Bazarov et al., 1982). However,

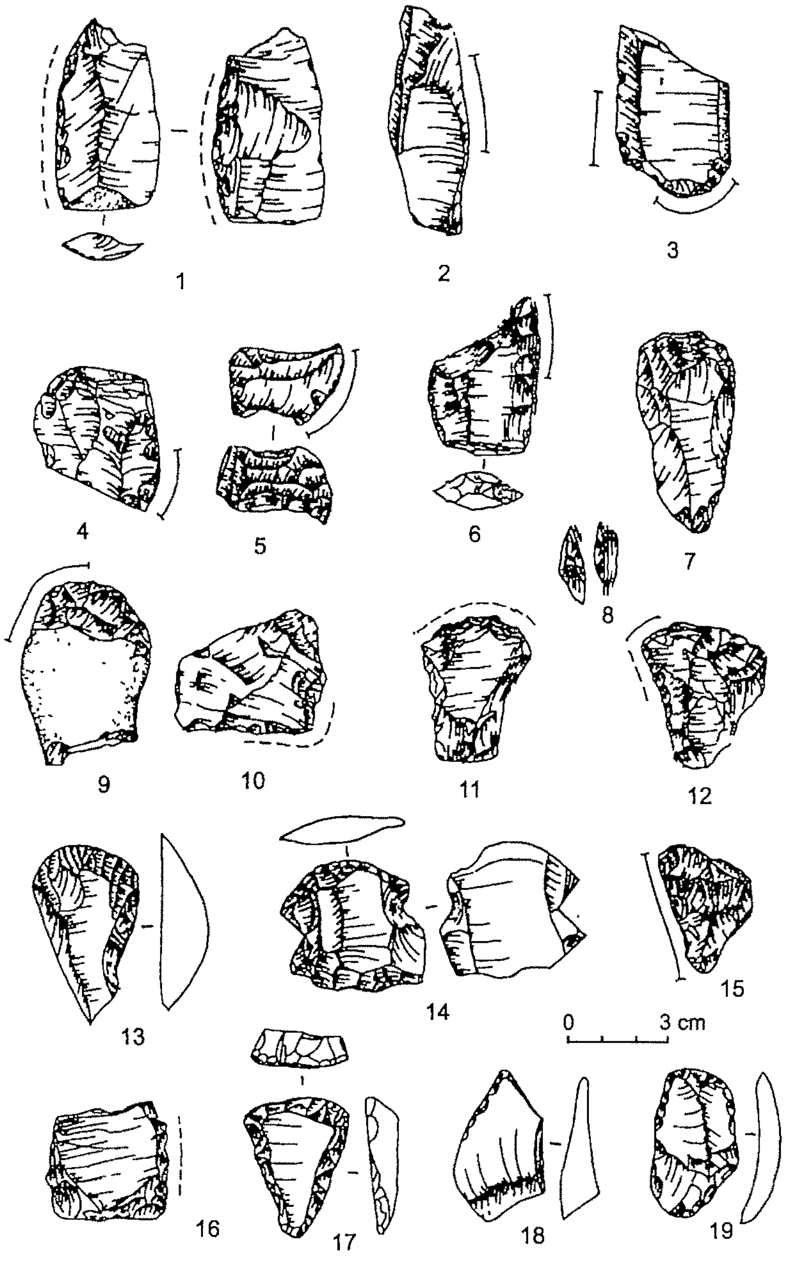


Fig 11. Lithic tools. Kamenka (B)
1, 2, 4 – 6 – knives, *3, 7, 9 – 13, 15 – 17, 19* – *grattoirs*, *8* – burin,
14 – combination tool, *18* – borer

unlike Okladnikov and Kirillov, he argued that "the Levallois stage of development should not be extended to the Initial Late Paleolithic, it should be delimited by the range of Mousterian time" (Bazarov et al., 1982: 10). He stated: "The Tolbaga industry apparently was rooted in Levallois technology, but it was no longer such", hence he disagreed with Okladnikov and Kirillov when they identified a "Levallois stage" or "Siberian Levallois phase" within Trans-Baikal Initial Upper Paleolithic collections (Ibid.). In my opinion, the technocomplexes from Sanny Mys, Varvarina Gora, and other sites on Okladnikov's list illustrate a prismatic evolutionary trend rather than Levallois. In his latest works in the 1990s, Konstantinov classified the Tolbaga industry as based on large and medium-sized blades, the relevant primary reduction being prismatic with relics of Levallois technology and traces of new technological methods of producing blanks from large narrow-face cores. The latest occurrences of Levallois technology were noted in the upper levels at Sanny Mys attributed to the final Upper Pleistocene (Vasiliev et al., 1993; Konstantinov, 1994). K. Escatenaire-Sitlivy and V. Sitlivy (1996) classified the Tolbaga industry as non-Levallois with the predominant bipolar technique of flaking and elements of recurrent methods of flaking and the presence of micro-cores.

The complicated and debatable problem of the Middle to Upper Paleolithic transition as well as recent propositions for its resolution (Kamenny vek.. , 1989; Boëda, 1988, Van-Peer, 1992; Derevianko, Kholiushkin, Rostovtsev, Voronin, 1998; Nekhoroshev, 1999) makes calculation of the Levallois index for Initial Upper Paleolithic technocomplexes meaningless. On the other hand, two Levallois indices (Levallois typological and Levallois technical) seem significant for the Late Mousterian and "transitional" technocomplexes. I have calculated the Levallois index (Levallois technology *sensu lato*) for the Uda basin collections (for points, blades, flakes, and nuclei, respectively) on the basis of technical-typological features of spalls and core morphology. It seems that these indices, which do not exceed 8%, cannot serve as diagnostic features in the attribution of "transitional" industries, though they reflect characteristic features of these industries in general (see Table 2).

The possibility of laminar blank production is stipulated first by the quality of raw material, and also by the reduction strategy employed, flaking surface and striking platform preparation, and faceting of the striking platform for production of the consequent flakes. The high index of faceting noted within the Kamenka (A) technocomplex may also be explained by this fact. Such faceting indices (reflecting precise and rough reforming of the platforms) indicate the technological specificity of the Khotyk (2, 3) and Kamenka (A) blade-based industries in comparison to blade-based complexes recovered from Varvarina Gora (2) and Khotyk (1). It is noteworthy that the Khotyk (2) industry demonstrates the closest analogues to other Trans-Baikalian complexes, like Tolbaga, while the Khotyk (3) and Kamenka (A) industries recovered from the earlier strata in their stratigraphic profiles demonstrate specific, local features.

The laminar technologies discussed in this article are based mostly on a common reduction strategy and the detachment of blades of different sizes and shapes through direct percussion, and flaking surfaces being prepared on various types of cores (mostly tabular, prismatic, and sub-prismatic). Flaking from opposing striking platforms represents the dominant reduction strategy.

The concepts of "transitional industries" and "Initial Upper Paleolithic" need special elucidation. Many researchers have adopted the term *"plast"*(archaeological entity) interpreted as "a conventional grouping of artifacts into large clusters on the basis of common or similar data derived from stratigraphy, state of surface preservation, petrography, and morphology of implements" (Medvedev, Skliarevsky, 1982). The "Kara-Bom" (or "Makarovo") archaeological entity has been established within the North Asian Paleolithic designating an interregional archaeological-stratigraphic system unifying industrial complexes which do not belong to a common culture but existed during one chronometric period and exhibited common technological features (Derevianko, Petrin, 1988; Derevianko, Kholiushkin, Rostovstev, Voronin, 1998; Rybin, 1999). In terms of this concept, the second and third subdivisions (or classes) of the Uda sites classification exhibit features characteristic of the "Kara-Bom" (or "Makarovo") archaeological entity and may be classified as transitional Middle to Upper Paleolithic.

Archaeological materials from the "transitional" period as a whole demonstrate a combination of technical-typological features of the Mousterian and the Initial Upper Paleolithic. Judging from the morphology of artifacts, industries of this period display a combination of particular reduction strategies: the Levallois, tabular, and prismatic traditions and proto-narrow-face flaking. Primary reduction is based mostly on parallel and sub-parallel patterns of flaking. The Levallois technology plays a subordinate role, being practiced as only one element of core preparation. Flaking from the narrow face of cores appears as well as archaic wedge-shaped forms, which are regarded as a final stage in the utilization of tabular cores under the parallel flaking pattern. The laminar index never falls below 40% within the Trans-Baikal materials, and the faceting indices are also rather high.

Secondary working patterns are dominated by dorsal retouch, and by such technological methods as burin spall detachment, intentional fragmenting, and ventral hewing. Tools are mostly produced on blades and blade fragments. The tool kit comprises elongated points, retouched blades, backed knives, Mousterian *racloirs*, notch-denticulate forms, *déjeté* tools, and end-scrapers including carinated varieties. Also, burins, borers, and combination tools have been identified. Points with thinned bases constitute a specific type. The bifacial technique was identified on individual specimens.

The Uda forest-steppe area has yielded a number of blade-based technocomplexes which reveal stratigraphic and technical-typological features that attest to their attribution to a common zone with a "considerably high degree of communicative relations". This vast area is characterized by "a common rhythm of cultural-historical development of the local Levallois-Mousterian lithic industries which, in their turn, served as bases for the development of Late Paleolithic industries" (Arkheologia..., 1998: 134). These blade-based industries might have evolved from Levallois industries in Central Asia and the greater Altai (Derevianko, 2001).

Another technological trend is demonstrated by the Upper Paleolithic complexes of Kamenka B, Mukhor-Tala-4, Kunalei (all located in the Trans-Baikal), and Kurtak-4 (in the Enisei River basin). This series of sites exhibits certain features analogous with other Upper Paleolithic cave sites in the northwestern Altai (Anoikin, 2000) and in Mongolia (Derevianko, 2001). The primary reduction strategy noted within these complexes represents a combination of Levallois laminar and radial flaking, with micro-technology also being well developed. The tool kit is dominated by Upper Paleolithic tool types, including carinated *grattoirs*, burins, and chisel-like tools. Few bifaces were reported. Bone and horn implements are scarce. Currently, the origin of this technological trend has not been clearly established, though it may be described as having developed out of local, non-blade-based Middle Paleolithic facies.

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PREHISTORIC ART

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ANCIENT TURKIC MEMORIALS IN THE ALTAI

Introduction

The Soviet-Mongolian Historic and Cultural Expedition (SMHCE), established in 1969*, has been working almost continuously in Mongolia since its inception. Judging from the published results of the expedition, the Mongolian portion of the Altai, being the highest and the most remote area in the Republic of Mongolia (Fig. 1), remains a real archaeological preserve. There, along with numerous early prehistoric memorials (such as Paleolithic sites, petroglyphs, deer stones and kereksurs**), burial mounds of early and medieval nomads as well as Ancient Turkic burial complexes have been found. According to our data, more than 200 stone sculptures left by Ancient Turks have been found in the territory of two *aimaqs* (provinces) bordering on Russia and China alone. Many monuments in the memorials have suffered from time, but in remote, inaccessible mountain gorges (Fig. 2) they have been preserved in an almost original form (Fig. 3, 4). Every researcher understands that these are monuments of great scientific value; they also present an opportunity to obtain new data about the ancient history of the people inhabiting Central Asia. Unfortunately, though, no monographs about the stone sculptures from Mongolia have yet been published, although short reports about them were already published in the 19th century (Potanin, 1881: 72 – 73, fig. 34; Granö, 1910: 29 – 30, Taf. XIII, XIV, etc.). In the last two decades, a number of interesting books, articles and reports about Mongolian stone sculptures and memorial monuments have appeared. Based on the materials of SMHCE 1979 – 1982, Y.S. Hudiakov published an article with the classification of common Turkic memorial enclosures in Mongolia (1985). He also co-authored an article with Y.A. Plotnikov about the results of research on the Ancient Turkic memorial monuments near the northern offshoots of the Khan-Khukhii and Togtokhyn-Shil ranges (1990).

The monograph written by V.E. Voitov (1996) has been broadly discussed in the scientific community. It sums up the results of research on Ancient Turkic nobility memorials, conducted over a number of years. The author must be credited for putting together, ordering and interpreting numerous new data. Voitov has registered and examined 87 monuments. Materials collected by this author present a profound input into the field of Ancient Turkic archaeology of Central Asia.

Among our Mongolian colleagues, D. Bayar is noteworthy. He has been conducting a consistent study of monumental medieval memorials (Bayar, 1994, 1997; Bayar, Erdenebaatar, 1999). The publication by T. Byambadorj and Ch. Amartushvin also deserves mention (1998). It contains the description of 90 stone figures found in the Uvsunur *aimaq*. Mongolian scholars have made a great achievement in the field of historical studies with the publication of a kind of encyclopedia of ancient monuments. A considerable part of this encyclopedia is devoted to the description of works of monumental art such as deer stones and stone sculptures of the Turkic-Mongolian period (Mongol nutag..., 1999) By its content and design the encyclopedia is comparable with another general book on Mongolian antiquities published in Germany almost 20 years ago (Novgorodova, 1980).

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* It was renamed the Russian-Mongolian-American Expedition in 1995.

** Ritual barrows of the Bronze Age.

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Fig. 1. Mountain summits of the Buddhist sacred place Tabyn Bogdo Ula (Mongolian Altai).

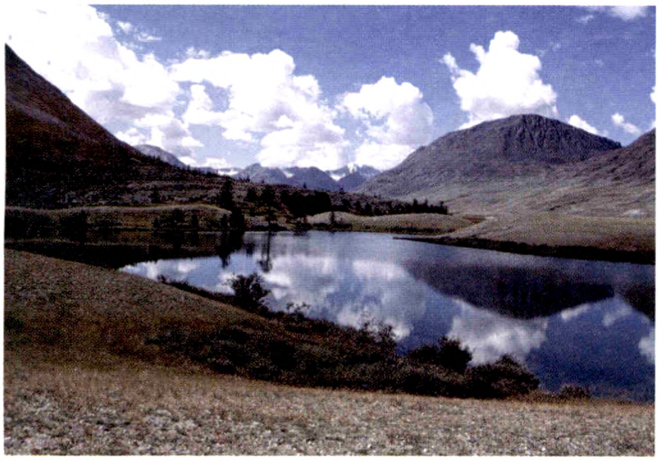

Fig. 2. The right bank of the Tsagaan Salaa River (Mongolian Altai), where a previously unknown Ancient Turkic memorial complex with sculptures has been discovered.

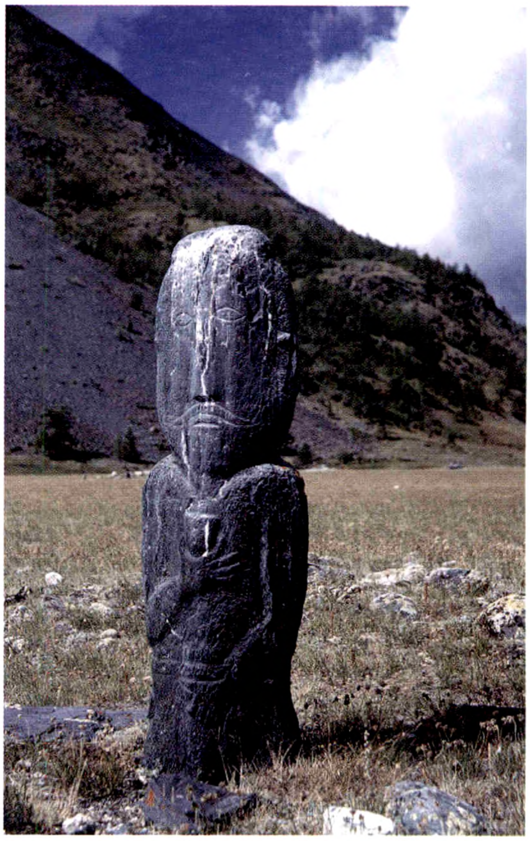

Fig. 3. Sculpture 1. Tsagaan Salaa (Mongolian Altai).

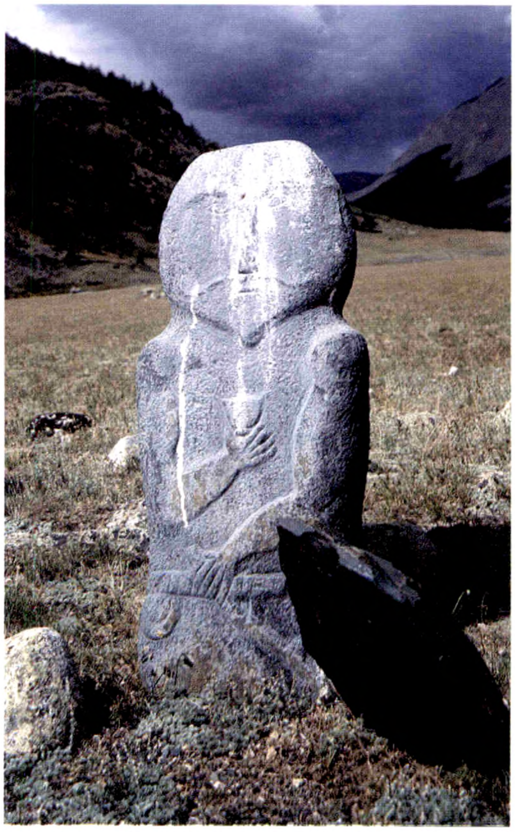

Fig. 4. Sculpture 4. Tsagaan Salaa (Mongolian Altai).

Japanese researcher Toshiyo Hayashi has prepared a summary on more than 330 sculptures, mostly distributed in Northwest and Central Mongolia (1996).

Chinese archaeologists Wang Bo and Qi Xiaoshan (1996) present certain groups of Ancient Turkic sculptures from Mongolia, the Altai, Tyva, and Dzhetysu in their summary work on stone sculptures of Xinjiang and Inner Mongolia.

The Joint Mongolian-American-Russian Expedition ("Altai Project"), established in 1993, continues the investigations in the Mongolian Altai. The primary goal of the project is to undertake a thorough study of ancient petroglyphs in the territory of the region. In the course of this expedition, a number of previously unknown sites of the Ancient Turkic culture have been discovered.

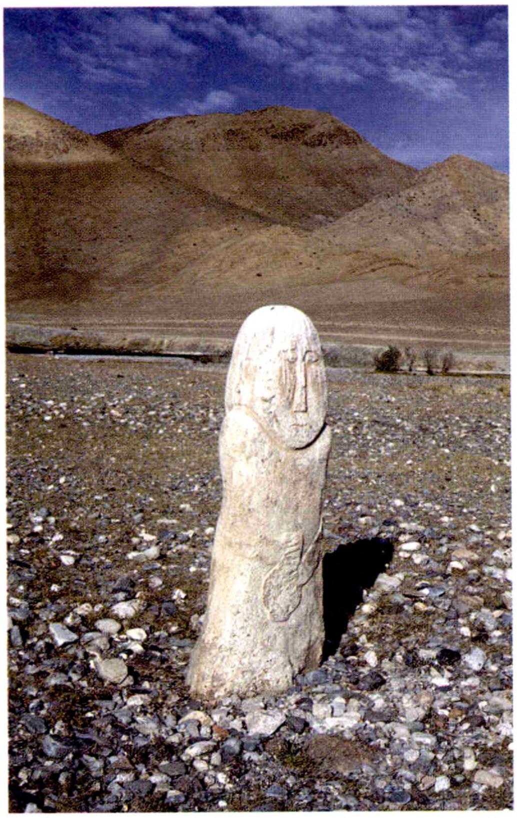

Fig. 5. A sculpture in the Sagsai River valley (Mongolian Altai).

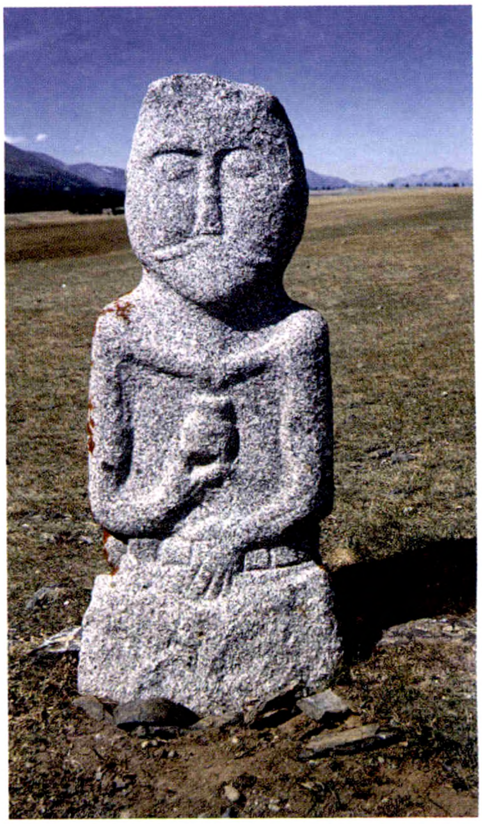

Fig. 7. Sculpture 1. Ikh Turgnii Gol (Mongolian Altai).

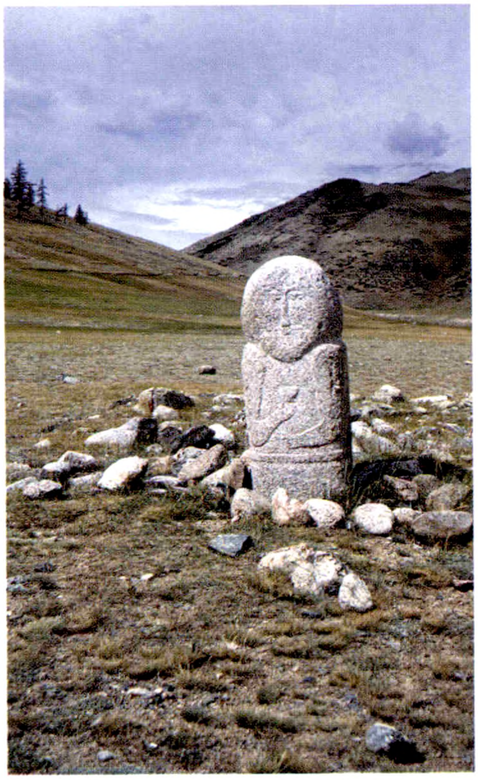

Fig. 6. A sculpture in the Mogoi River valley (Mongolian Altai).

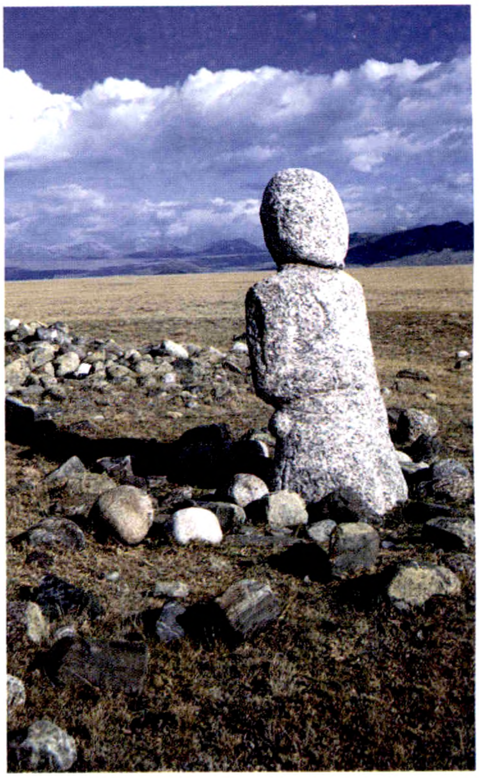

Fig. 8. Sculpture 3. Ikh Turgnii Gol (Mongolian Altai).

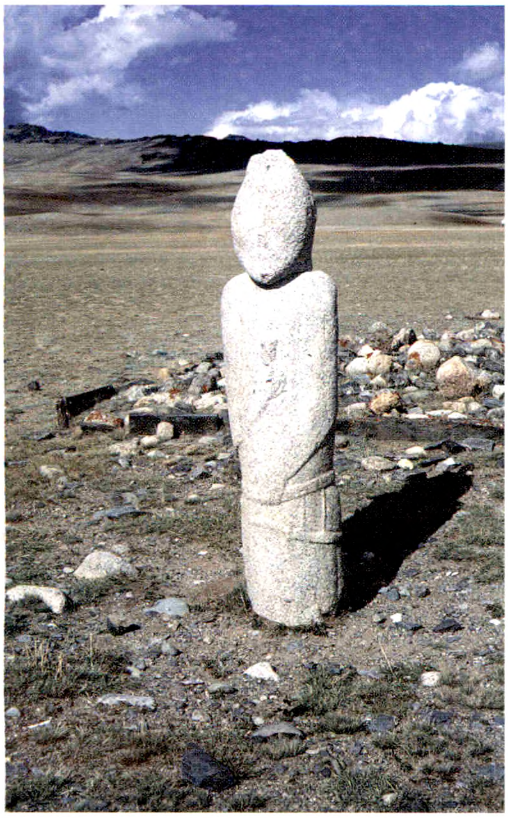

Fig. 9. Sculpture 1. Shar Bulak (Mongolian Altai).

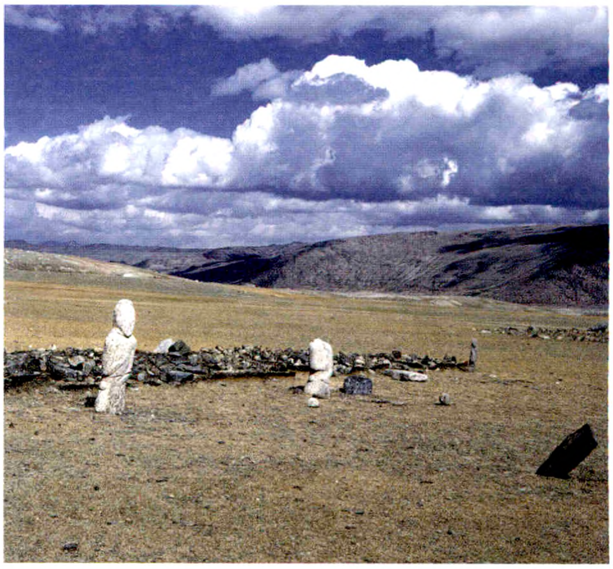

Fig. 11. Sculptures near Turkic enclosures. The southern bank of Lake Khurgan Nuur (Mongolian Altai).

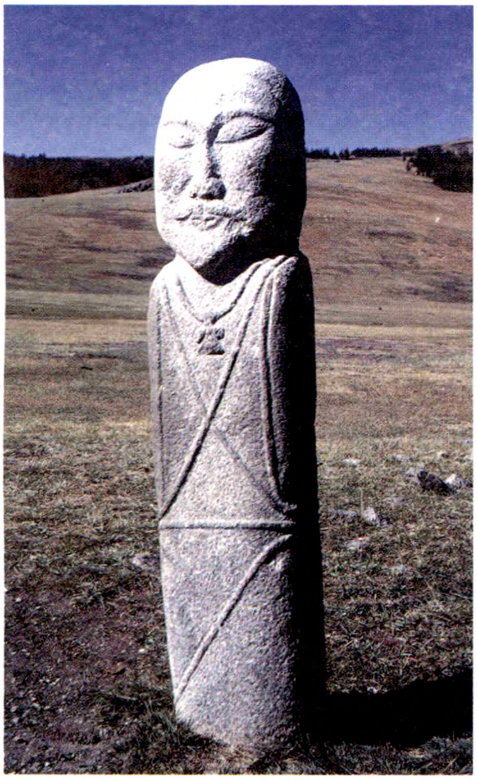

Fig. 10. A sculpture by Lake Dayan Nuur (Mongolian Altai).

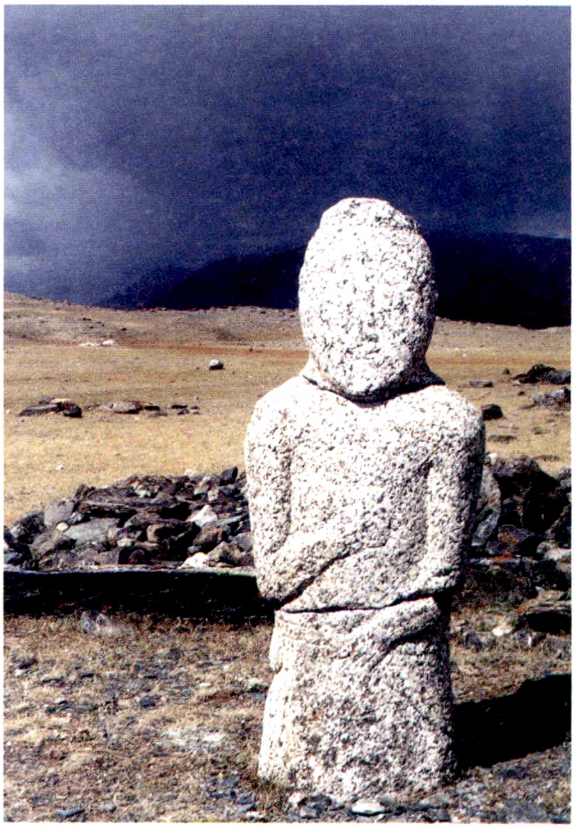

Fig. 12. Sculpture 1. The southern bank of Lake Khurgan Nuur (Mongolian Altai).

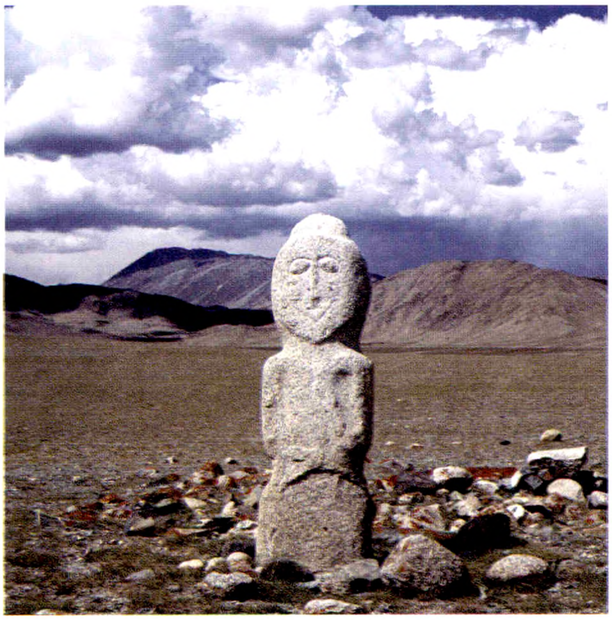

Fig. 13. A sculpture in the Mogoi River valley (Mongolian Altai).

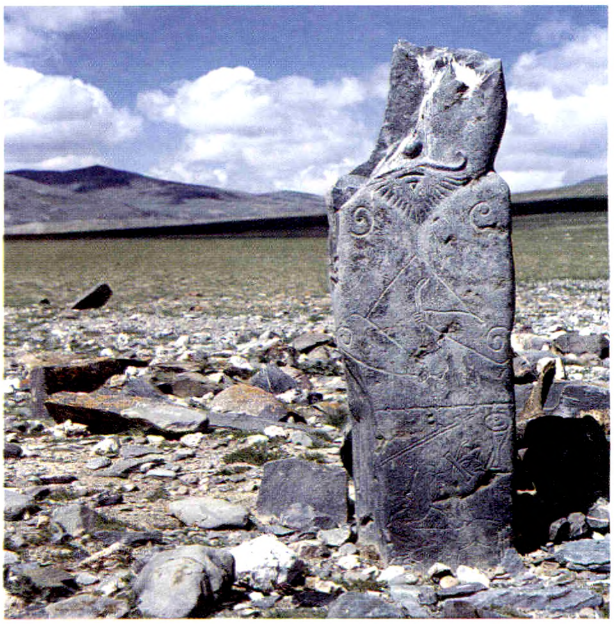

Fig. 15. A sculpture in the Khar Yamaatyn River valley (Mongolian Altai).

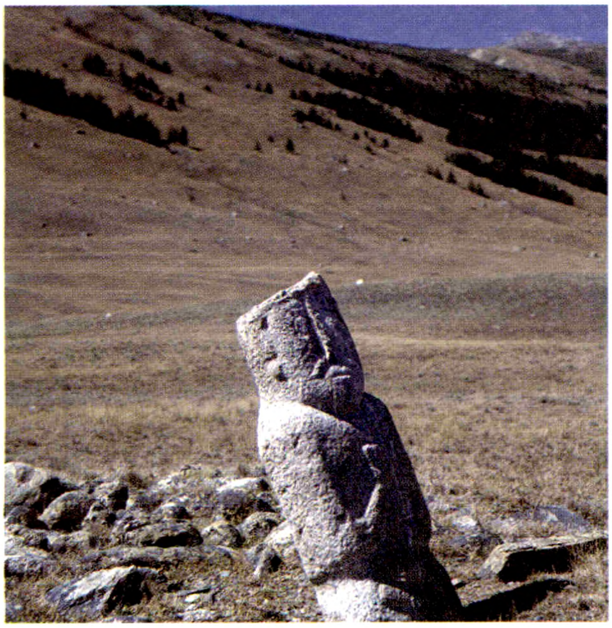

Fig. 14. Sculpture 2. Aral Tolgoi (Mongolian Altai).

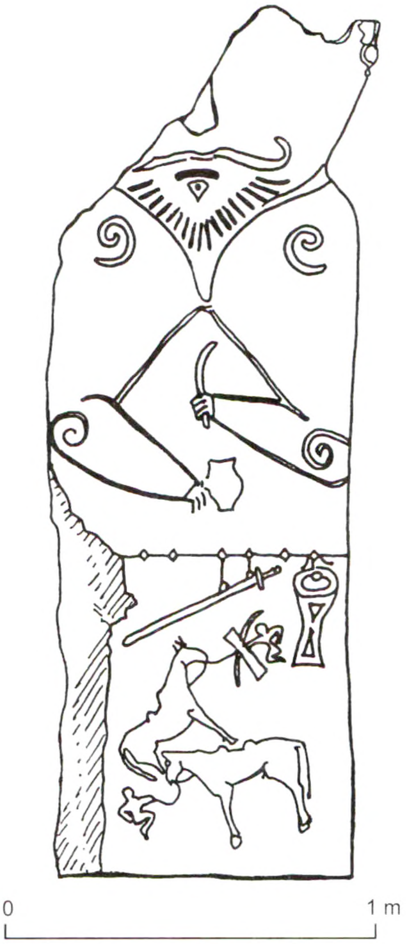

Fig. 16. A drawing of realities and scenes of "genuflection" on the sculpture in the Khar Yamaatyn River valley (Mongolian Altai).

A number of brief reports on the findings were made (Kubarev V.D., 1995, 1996; Kubarev V.D., Jacobson, Tseveendorj, 1994; Kubarev V.D., Tseveendorj, Jacobson, 1995, 1998). There also appeared a number of publications devoted to specific aspects of the sites under study (Kubarev V.D., Tseveendorj, 1995, 2000; Kubarev G.V., Tseveendorj, 1999; Kubarev V.D., Zevendorz, 1997).

In the Mongolian Altai, 200 memorial monuments of noble and common representatives of the nomadic population of the Ancient Turkic epoch dated to the

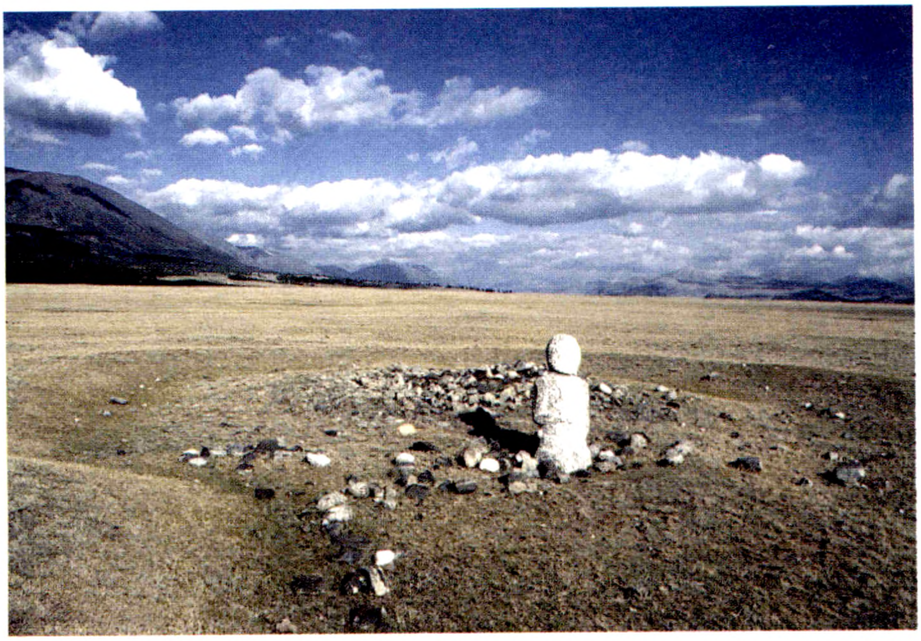

Fig. 17. A memorial of a noble Turkic man in Syrgal (Mongolian Altai).

6th – 8th centuries have been discovered and studied, including 49 stone sculptures (Fig. 4 – 17).

New materials and publications make it possible to renew the discussion about the origin and purpose of the memorial constructions of the Ancient Turkic population. Some of the statements, reconstructions and conclusions made by one of the co-authors 17 years ago (see (Kubarev V.D., 1984: 41 – 81)) are now being criticized and thus require correction and new supportive arguments. First of all, it concerns the interpretation of such predominant elements of Turkic memorials as the "memorial post," a tree, and *balbals* (vertical stone slabs), as well as the dating of individual monuments in Mongolia and the Altai.

Typology and chronology

V.D. Kubarev has proposed a classification of the Altai memorial enclosures*. He has distinguished five main types of enclosures – Ayutin, Yustyd, Ulandryk, Kudyrge, and Yakonur – on the basis of analyzing 116 excavated objects. This classification has been accepted by many researchers (Vasyutin, Elin, 1983; Savinov, 1984: 69 – 70; Mamadakov, 1994: 59; Soyonov, Ebel, 1997: 115; Mogilnikov, 1992: 187; Iliuyshin, Suleimenov, 1997: 96; etc.). It turns out that this classification is applicable to other similar synchronic memorials, having been researched in the regions neighboring the Altai (Ovchinnikova, Fedorova, 1992: 83; Klyashtorny, Savinov, 1994: 120 – 124; Kostyukov, 1994: 150; Botalov, 1996: 225; Kubarev G.V., Tseveendorj, 1999: 170; etc.) This is clear, since the Altai, ancient motherland of the Turkic people, was within the sphere of political influence of all the kaganates*. On the other hand, mountainous and inaccessible areas in the center of the Altai served as a refuge. They also constituted the northern province within the Turkic state unions. This ethno-geographic feature defines both the unique character of the Altai burial and commemorative complexes and their similarity to the Tyvinian and Mongolian memorials. Some scientists have proposed their own classifications that do not take into account the typological and chronological schemes developed by their predecessors.

Having critically considered our typology, V.E. Voitov developed his own classification (1996: 25). It should be noted, though, that he often has to rely on our classification in his work. His classification is based on the methodological principles suggested by B.Y. Vladimirtsov and Y.S. Hudiakov. For the most part, Voitov's classification covers "princely" memorial monuments in Mongolia, while our typology has been suggested for the common memorial enclosures in the Altai. Its shortcomings are quite evident and were described at the early stages of its development by

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* A memorial enclosure is a structure made of vertically placed stone slabs and is associated with a commemorative ceremony for a departed common Turk.

* State unions of Turkic tribes.

V.D. Kubarev (1979b: 150). At that time there was only a limited amount of information about the Turkic memorial enclosures. By now it has been considerably enriched: over the last 20 years, the number of excavated monuments has reached 130 objects in the territory of the Russian Altai alone. As expected, some of the monuments "cannot be classified under any of the kinds of Turkic enclosures that were distinguished by A A. Gavrilova and V.D. Kubarev" (Neverov, Gorbunov, 1995: 170). At the same time, the classification itself is not faultless (Mogilnikov, 1992: 197) and requires "additional research and correction" (Grigoriev, Zagorodny, 1995: 178).

It is known that any classification is built upon the similarities and differences between the constructive features of monuments belonging to the same culture. Also, a classification has to conform to the identification of regularities and variations within one and the same group. It should be remembered, though, that any typology presents a rather crude tool, which sometimes prevents distinguishing even the most essential differences among the Turkic memorials. Having similar basic elements, each of them – from complex constructions of the nobility to the enclosures of common nomads – has its own specific features that reflect the local, temporal, social and age-sex peculiarities in the traditions of the burial ceremonies specific to the Ancient Turkic population in Central Asia. When classifying the monuments, the state of preservation of all their parts should be taken into consideration. Some researchers place "complexes without steles and *balbals*" into a separate group. "Such objects testify that for some reason (for example, if the deceased did not kill a single enemy in his life and the *balbals* could not be erected) the ceremony was not fully performed" (Hudiakov, 1985: 181). You could also read in another source: "It is probable that the graves [enclosures – *Authors' note*] without *balbals* contained the ashes of women and children: they are more numerous than the graves of men. This fact can be easily understood, if we take into consideration that it was quite difficult to transport the body of the deceased man from the battlefield; thus, not all the warriors were buried behind the enclosures prepared for them" (Gumilev, 1959. 112). It is hardly possible to agree with such conclusions, even less so with the suggested interpretation, since the objects outside the enclosures – sculptures, steles, *balbals*, masonries, etc. – could have disappeared right after their erection or in modern times (through deliberate destruction, removal and transfer of the monuments, etc.).

An attempt made by Voitov to revise the chronological sequence in the construction of four enclosures in the Dier-Tebe complex in the East Altai (1996: 70) seems to be inconsistent. The dates he suggested (6th – 7th and 7th – 8th centuries) cannot be accepted, not only because of a large chronological gap between them, but also because all the constructions are united by such a common element of this (family?) memorial as the presence of tree roots in all four enclosures. This (ethnographic?) peculiarity was first observed in the memorial constructions of the Turkic-speaking Tugyu people. It still remains the only source of information for the reconstruction of another kind of memorial rite practiced by the population of the East Altai in the 10th century.

The typology of the Altai memorial enclosures can be revised and supplemented on the basis of the newest data. For example, the enclosure in Yan-Gobo in the Russian Altai (Fig. 18), earlier classified as a commemorative construction of the Turkic nobility, can be recognized as a separate class *. The basic principles of planygraphy specific to the Ancient Turkic commemorative monuments have been observed in this enclosure: it is oriented by its sides to the compass points, the monument (in this case substituted for a deer stone) and a row of *balbals* oriented to the east are present. However, the construction of the enclosure (47 massive slabs), its large size (13.5 × 13.5 m), the absence of a bank and a ditch, as well as the presence of an unusual construction shaped as a rectangular stone box in the center of the enclosure, are not typical of the nobility memorials, nor are they typical of the Turkic minor enclosures. Already in the first publication we paid attention to the uniqueness of this monument, which up to now remains the only one of its kind recorded in the Altai (Kubarev V.D., 1984: 53 – 55; 218, plate XXXIX). The research of the Bugut temple complex in Mongolia undertaken by Kliashtorny and Voitov has, to a certain extent, clarified the purpose of the Yan-Gobo enclosure, as well as the time of its construction. The observation made by Voitov, who pointed to evident similarities in the planygraphy, elements of construction and the composition of findings in both cases, undoubtedly deserves attention (1996: 68 – 70). Characteristic features of the constructions and the absence of sculptures in the memorials contrast greatly with the majority of the Turkic commemorative monuments in Central Asia. The first Soghdian inscription on the Bugut stele in memory of the Kagan** Taspar made it possible to consider this complex as the most ancient dated commemorative monument in Mongolia (Kliashtorny, Livshits, 1971: 121).

When considering our chronological classification of the Altai memorial enclosures, Voitov made the following remark: "The first pieces of information about the enclosure of the Yustyd kind in the Altai were presented by L.N. Gumilev" (1996: 24). Gumilev did mention the only enclosure discovered in the Ulagan River valley situated higher than the Tushagar *ail* (Altaian wooden dwelling), but he defined it visually as a Turkic grave (1959: 110). He considered the "third variant of a square grave with stone obelisks" (it was studied on the right bank of the Ulagan River) to be a burial (Ibid.). What we actually find here are three adjacent rectangular enclosures with a central stele in them. We examined the ritual object under discussion before excavation started there and after it was studied by A.M. Iliushin and M.G. Suleimenov (1997: 95, 100, fig. 4). As expected, no new materials were found. It is the opinion of many archaeologists that the mentioned monuments belong to the Late Bronze or Early Iron Age. In the center of another enclosure constructed from four massive slabs, discovered by Gumiliev and mentioned by Voitov, thirteen iron objects were found during the excavation. By the findings from this site, the researchers dated it to the 9th – 10th centuries; they were quite right to classify this enclosure as the Ulandryk type (Iliushin, Suleimenov, 1997: 96, 102, fig. 6). This is the reason why the remark Voitov made can be accepted with the commentary made above. As for the determination of the ethnic origin of the monuments as belonging to the Tölösam (or Tele) population, which was not supported by either archaeological or ethnographic data, we should support L.P. Potapov's opinion that "[Gumiliev's] initiative to take into account the archaeological material in resolving the matter was unsuccessful due to the insufficient competence of the author in archaeology" (1987: 55).

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* We will refrain from doing so now, because this monument is the only one of its kind in the Altai.

** Political and military leader of a kaganate.

In 1988, four Yustyd type enclosures were studied on the southern bank of Lake Khurgan-Nuur (Mongolian Altai). Like the enclosures on the Yustyd River (Fig. 19), these enclosures were constructed from four massive slabs standing edgewise; their dimensions are small: (1) 1.5 × 1.5 m; (2) 2.8 × 2.8 m; (3) 2.9 × 2.8 m; and (4) 2.5 × 2.5 m. From the eastern side of the enclosures, there are four small sculptures and four rows of upset *balbals* with not more than 10 stones in each. The enclosures are not filled with stones, which is also characteristic of the Altai Yustyd memorials. Also, a "rhomb grid" marks the exterior of one of the slabs in weak strokes. Similar geometric ornament is particularly typical

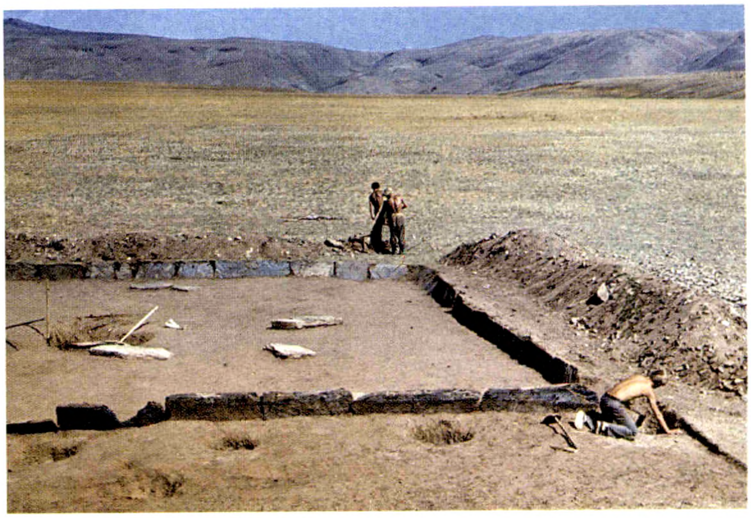

Fig. 18. An early Turkic memorial in Yan-Gobo (Russian Altai).

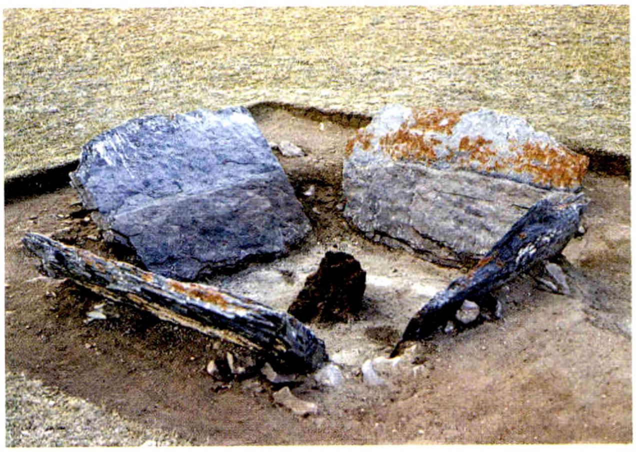

Fig. 19. An Ancient Turkic memorial enclosure in the Yustyd River valley (Russian Altai).

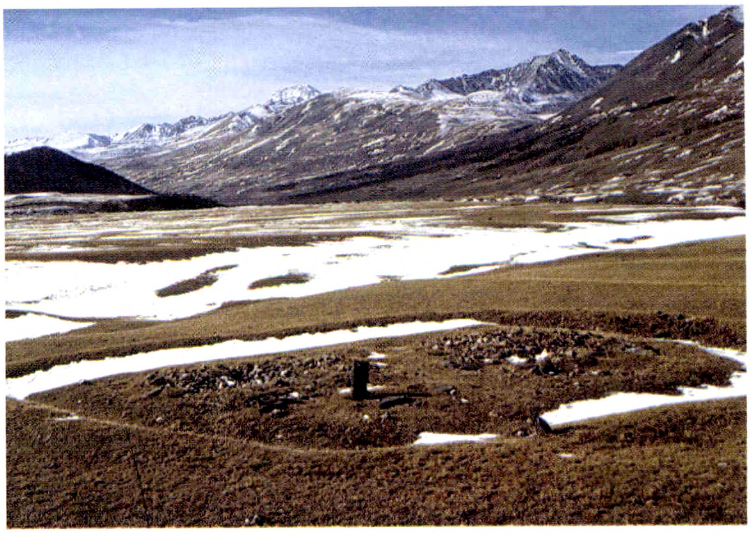

Fig. 20. A memorial of two noble Turkic warriors in the Ayuta River valley (Russian Altai).

of a considerable number of the "princely" memorials in Mongolia (Novgorodova, 1980: Abb. 203; Voitov, 1986: 77, fig. 3, *2*). This kind of ornament was also found in the Russian Altai. Voitov interprets the ornaments decorating the slabs of "wooden boxes" found on one of the enclosure plates in the Makazhan steppe (Kubarev V.D, 1984: 209, plate XXX, *3*) as being characteristic signs "pointing to a distinct ethnical affiliation of the burial memorials' owners…'" (Voitov, 1986: 88). In our opinion, the "rhomb grid" *terme* design represents a lattice wooden yourt (transportable felt tent-like dwelling) frame. Other ornaments on the slabs of "wooden boxes" are topically close to the designs decorating the doors of Mongolian yourts (Maidar, Darsuren, 1976. plates 20, 37, 42, 49).

In Voitov's opinion, an enclosure with stone filling and wood inside (see Fig. 19) was typical of all social groups of the population in the First Turkic Kaganate. The researcher thinks that in later times the enclosure was preserved only among '*kara budun*' (in Turkic – 'black people' – common nomads), while in the memorials of the aristocracy it was transformed into four-slab boxes (Voitov, 1996. 118). This conclusion might be credible for the memorial monuments in Central Mongolia; as for the Altai (both Russian and Mongolian) "four-slab boxes" (enclosures made from four massive slabs) are typical of the memorial constructions of both common nomads and nomad aristocracy *. They do not reflect the social differences within the Altai Turkic population. In both cases the presence of trees or posts** suggests that the Altai Turkic people had the same world outlook; also, that two different traditions, and two types of commemorative constructions, namely Yustyd and Ayutin, were developing in parallel over a long period of time.

The principal features that make it possible to distinguish the constructions of the aristocracy from a large number of the Altai enclosures are a bank and a ditch around the enclosure (see Fig. 17, 20) as well as a more realistic (usually with military attributes) appearance of stone figures. It should be noted, though, that some of the Altai sculptures were made with great attention to details, accuracy and skill; for example, "Kezer" in the Kurai steppe, statues in Keme-Kechu in the Argut River valley and so on. These sculptures were placed next to the usual Yakonur enclosures, while there was no bank or ditch around the enclosures. Out of eleven memorials of the Turkic aristocracy discovered in the Russian Altai (Kubarev V.D., 1984: 51 – 55; Savinov, 1994: 151 – 152), there were two enclosures in each of the memorials; they were surrounded by a joint bank and a ditch (see, e.g , Fig. 20). In neighboring Mongolia, five memorials similar in construction have been registered (Voitov, 1996: 49). The conclusion made by Hudiakov that the "presence of paired enclosures along with the single ones cannot be persuasively explained as yet" (1985: 181) seems to be rather pessimistic. A sufficient number of paired enclosures in the Altai and Mongolia that represent a single, synchronous complex, suggest not that the "canons were violated" (Ibid.), but that it was rather traditional for the Ancient Turkic people to erect paired sculptures of men-warriors. Similar memorials, having been especially well-preserved in the mountains of the Russian Altai (Kubarev V.D., 1984: 51 – 52, 55; 198, sculpt. 114, 115; 212: sculpt. 198, 199), praise the feats of the battles of the Ancient Turkic aristocracy and the leaders of their military retinues. It is possible that the paired sculptures showed two co-rulers (*shada-sada*) who were military leaders at the same time. Their burials stand out sharply before a background of mass barrows (kurgans) of common nomads. First of all, they are distinguished by the large size of stone mounds. Second, they are characterized by a large number of horses (up to four) buried with one man. Third, their characteristic feature is numerous expensive articles, armor and weapons placed into the graves (Kubarev V.D., 1987; Kubarev G.V., 1991, 1997a: 16; 1997b). Like the paired memorial enclosures with the sculptures of two noble Turkic men (possibly carved by the same artisan), the mounds of the prince's military retinue were erected in pairs and seemingly simultaneously. It is evidenced by the identity of all the features of burial rites and a similar selection of rich utensils. In the Ancient Turkic society with its tribal division there also existed a parallel tradition of symbolic paired burials of noble warriors (sworn-brothers?) in the same grave-cenotaph (Savinov, 1987: 80) or in separate large mounds erected side by side (Kubarev V.D., 1985: 138).

Four memorial buildings of the representatives of the prince's retinue have been excavated in the territory of the Mongolian Altai in recent years (Kubarev V.D., 1995; Kubarev V.D., Tseveendorj, Jacobson, 1995: 324, 1998. 261 – 262). Of particular interest are the narrative scenes depicted on the slabs of these memorials and even on the sculptures themselves (see Fig. 15, 16). The constructive characteristics of the commemorative constructions are close to the synchronous memorials in the Russian Altai and Tyva. These Mongolian memorials fill up one more of the lacunas bridging the gap between the memorial monuments in the central Mongolian regions and the western periphery of the Ancient Turkic world.

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* Some scholars refer to the memorial constructions of the Turkic nomad aristocracy as "sarcophagi" (Hudiakov, 1985. 175 – 177), although others long ago discarded this term, finding it outdated and disorienting, failing to describe the function of memorials. The opinion that the "sarcophagi are common only in Mongolia" (Ibid · 182) should also be considered erroneous

**The remains of tree trunks or posts have been found in the stone "box" excavated by V.V Volkov in Shan-Tengerin-tal (1981b. 26). They were also found in four-slab "boxes" of the Dadga-Khushot complex (Hudiakov, 1985: 177 – 178, fig 11, 12) known as Khuduu-Nur (Voitov, 1996. 49, fig. 31, 32) Such a composition of the principle elements found in Dadga-Khushot, namely, a stone four-slab box + a tree + ceramics, is culturally and chronologically connected to the Altai Yustyd enclosures: four massive slabs forming a box + a tree + sacrificial vessels from ceramics and metal. The similarity is strengthened by the construction of one of the Altai Yustyd enclosures that was excavated by the present authors in the Makazhan steppe (Kubarev V.D., 1984· 209, plate XXX) From its eastern side, there was a sculptured anthropomorphic figure with a ceramic vessel at its base, while the complex as a whole, being surrounded by a bank and a ditch, resembled similar constructions found in Mongolia (Voitov, 1996: 27 – 60).

From the above reasoning of the authors and the factual data, we cannot agree with the conclusion – not supported by evidence – made by B.B. Ovchinnikova that the "memorial enclosures of the Ancient Turkic population and the "Orkhon temples"* are commemorative constructions that have *nothing in common*" [italicised by the authors] (1998: 208). Comparative analysis of the planygraphy as well as the correlation between the composite parts of the burial architecture characteristic of the Orkhon complexes and the common enclosures has demonstrated their complete identity (Kubarev V.D., 1984: 59 – 63). "Four memorials near the Tsaidam lakes serve as a standard by which all the other Turkic memorial constructions can be compared. Their layout is essentially no different from that of the majority of the common stone enclosures" (Voitov, 1985: 131). The same conclusion, namely about the functional unity of the Asian burial enclosures and the Orkhon memorials, has been made by a number of other researchers (Grach, 1955, 1961; Kyzlasov, 1964, 1969; Sher, 1964, 1966; Novgorodova, 1981; Klıashtorny, Savinov, 1994; Yumatov, 1998; etc.)

"Memorial post," a tree, a model of a dwelling

None of the researchers who have studied the memorial monuments of the Ancient Turks could convincingly explain the reason why the remnants of many of the "memorial posts" (mentioned in the Chinese chronicles) are charred in their upper part. Why were they set on fire (if these were actually posts)? Also, what is the difference between a "memorial post" and ordinary posts put at the corners of the enclosures or dug in its center? Hudiakov holds an original point of view on this matter. He supposes that in the pits found in the centers of enclosures there stood the "memorial posts" (Hudiakov, 1985. 180) or "tree stumps" (Hudiakov, Kim, 1999: 29) Hudiakov and Kim have denied the reconstructions proposed by L.R. Kyzlasov and V.D. Kubarev. These reconstructions are based on archaeological and ethnographic materials**. (Ibid.: 28 – 29). However Hudiakov still believes that it is possible to assume that a more important element of the ritual was the construction of a "building near the grave," if we consider this building to be the enclosure itself (1985: 179). What is the difference between a "enclosure-building" and the "enclosure-dwelling" we have in mind, the graphic reconstruction of which Hudiakov and Kim call "a small wooden framed dwelling with a four-sloped roof" (Hudiakov, Kim, 1999: 29), while V.A. Mogilnikov refers to it as a "framed construction" (1992: 192)?

It was not very long ago that Hudiakov wrote: "It is possible that the construction of a memorial wooden post was connected with the idea of a 'world tree.' Maybe this is the reason why posts with remnants of a root system were found in some of the discovered Altai enclosures" (1985: 180). Only the latest research and findings in Tyva can explain the change in the opinion of the scholars about one of the primary elements of the Turkic enclosures. It is the opinion of Hudiakov and Kim that new data "making a considerable contribution to the already existing materials on the burial rites of the Ancient Turks" (1999: 29) were obtained when researching three enclosures of the Alkaak burial ground. The researchers consider the discovery of a "tree stump with the roots up" to be of principle importance for the reconstruction of the burial ritual of the Ancient Turks. On the basis of this finding the scientists conclude that "trees with branchy crowns did not and could not exist in the Ancient Turkic enclosures. It is possible that the tree stumps were put inside the pits in the process of the commemorative ceremony prior to the construction of a mound and were not intended to be towering over the ground (Ibid.). Such an explanation, though, does not answer the question of for what purpose the "tree stumps" were put into the pits.

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* Memorials of noble Turks located on the Orkhon River.

** In our graphical reconstructions of the exterior appearance of the sub-terranean memorial constructions of the Ancient Turkic population only new archaeological data have been used. They were obtained by one of the co-authors as a result of a complex study of more than 50 enclosures in the Altai. For the hypothetical reconstruction of all the cycles observed in the burial rites of the Turks, materials on the religious and mythological conceptions of the Turkic speaking population of the Sayan-Altai were used The individual differences in some details of the memorial constructions published over the last three decades (Kubarev V.D , 1978: 96, fig. 9, 1984: 80, fig. 16, 1997: 26, 33) stem from the constructional differences of the Altai memorial constructions possibly connected with two ethnic groups, namely Tele and Tugyu. The same differences have been preserved in burial and memorial monuments in the Altai to date: small frames over the graves of the Telengits (Toshchakova, 1978: 131, fig 20) and carcass and post awnings with poles over the graves of Kazakhs (Konovalov, 1983 117) Suggested variants of reconstruction of the Ancient Turkic commemorative rite should be considered as a version with no pretence for the complete explanation of the semantics of the Turkic enclosures and the sequence of ritual actions performed in them It seems likely that all the secrets of the ritual, being shamanistic in its essence – at least in its virtual part – will never be fully revealed, since archaeology has rather limited abilities in this field.

The plausibility of the suggested reconstruction has been unexpectedly proved in the study of the late Turkic memorial complexes in the South Urals From six enclosures with sculptures, rather shallow pits were discovered in two of them over the perimeter of the slab fencing; also, pits in the construction centers were discovered. In the filling of the pits, remnants of charred posts or poles were found. One of these enclosures demonstrates an especially unusual construction. Its contour can be spotted in the bedrock by the strips of a charred tree, its width being up to 8 cm and thickness up to 5 cm. They "were recorded as remnants of a square frame (2.2 × 2.2 m) built from skids and placed into a specially prepared ... cavity" (Kostyukov, 1994 145 – 147, fig. 3). In the opinion of the author, additional materials such as charred posts and remnants of a burnt wooden frame testify to the credibility of the suggested interpretation of the Turkic enclosures as the models of the nomadic winter dwellings He says that "it all testifies to the existence of initially volumetric wooden constructions"(Ibid.. 156). The sacrificial-memorial complexes in Koshkarbai, Kammeny Ambar and Aksak in the South Urals are the closest to the Altai memorial monuments in Uzuntal and Yustyd (Botalov, 1996: 225; Babenkov, 1996: 248).

The discovery of post remnants of wooden constructions over some enclosures in Mongolia, Tyva and the Altai seems to be quite evident and natural. The same can be said about the remnants of larches with their root systems preserved in the ground (enclosures in Dier-Tebe and Alkaak). There seems to be no necessity to explain and prove a self-evident truth. Over a thousand years have passed since the construction of the Ancient Turkic memorials, a period not every wooden construction can survive. There are cases, nevertheless, when the modern surfaces of the post remnants and tree trunks have been well preserved in the Ancient Turkic enclosures of the Altai. As early as 20 years ago, the present authors found such examples in the Russian Altai and the Chuiskaya steppe: near the villages of Mukhor-Tarkhata, Ortolyk, Beltyr and Chagan-Uzun. One of them is an enclosure with a sculpture and *balbals* by the mouth of the Chagan-Uzun River. In the center of the enclosure there is an unbarked larch trunk with its lower end pointed and put into the ground to the depth of 1.2 m; its upper part, having been severely charred, rises over one meter above the enclosure *. Three more examples of remnants of wooden constructions in the Turkic enclosures were found near the Kokorya village: "In the center of one of the enclosures (Kyzyl-Chin III burial ground) a protruding fragment of a larch log was discovered..." (Vasyutin, 1980: 195); on the Kaman-Ton hill in the north-eastern corner of an enclosure with a sculpture the lower part of a larch post was sticking out from the ground (Kubarev V.D., 1984: 163); in the Kotyr-Tas I burial ground in the enclosure N7, a log was found in the place of plates on one of its sides (Surazakov, 1993· 50). Such a phenomenon can be explained by severe climatic conditions in the Alpine Chuiskaya steppe. But even in the neighboring Kuraiskaya steppe, situated much lower, in the basin of the Ursul River, good preservation of trees in the 14 enclosures excavated by S.V. Kisilev and L.A. Evtykhova was noted. In the center of the enclosure with the well-known sculpture of "Kezer" (in the Tötö area), a "thick tree log" 70 cm in diameter, charred in its upper part, was discovered (Kiselev, 1951: 545). If considerable thickness of trees (or posts) as well as the pit depth (up to 1 m and more) are taken into consideration, a conclusion can be made that quite large trees and posts were placed on the burial sites.

In the undoubtedly unique case of the memorial on the Dier-Tebe hill when the roots of the trees dug in the center of enclosures were preserved, it may be quite logical to assume that the branches of these trees were also preserved. It is not at all important how the trees were dug into the ground: with their roots down (Kubarev V.D , 1979a. 96 – 98, fig. 9) or up (Hudiakov, Kim, 1999: 29), since both positions serve as a symbolic representation of the upper world (Gerasimova, 1989: 170 – 173). The image of a world tree growing with its roots up has been known both in the shamans' practice (Sternberg, 1936. 211; Anisimov, 1952: 198) and many world religions. Drawings of trees – with their roots either up or down – have been found on the shaman tambourines of the Altaians as well as on *töses* (shaman amulets) of the Khakass (Ivanov, 1955: 168 – 169, fig. 1, 2; 221, fig. 21). In Kyzlasov's opinion, their symbolism was already known in the early Middle Ages (1990: 263, fig. 2).

In the world outlook of the South Siberian populations, the tree is a sacral center and a cosmic axis that unites three worlds (Livova et al., 1988: 32; Potapov, 1992: 539) Many peoples associate the tree with their mythological conception of life in its fullness (the tree of life) and its opposition to death and destruction (the tree of death) (Ivanov, Toporov, 1991). The idea of a tree's regeneration and death is also manifested in the rite of the second birth of the Qidan emperor who had to walk around the trees, their roots being up (i.e., turned to the firmament), several times (Ye Lung Li, 1979: 524). The same idea has been preserved in the traditional burial and memorial cycles of the Turkic speaking population of Siberia: guiding the deceased from the ancestral tree, burying the ashes of shamans in the hollow of a tree-trunk, aerial burials on a platform put among the tree branches, etc. (Diakonova, 1975: 67; Toshchakova, 1978 129; Gerasimova, 1989: 207; etc.). This idea survives in the religious beliefs and practices of the modern day Altai population (Kypchakova, 1983; Chanchibayeva, 1978).

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* A large wood sample cut from the tree trunk in the enclosure from Chagan-Uzun has been deposited in the collection of the Institute of Archaeology and Ethnography SB RAS (Novosibirsk). The trunk diameter is 37 cm. Counting the tree rings allowed I.Y Sljysarenko to determine the age of the tree to be approximately 350 years In some of the enclosures excavated in Tyva "the lower parts of tall, single, subsequently burnt wooden posts that were once standing there" have been preserved (Kyzlasov, 1969 30). In East Kazakhstan, in the early stages of studying the commemorative enclosures, A V. Adrianov found "the remnants of a charred, not thick larch trunk" (1916 47)

We should also agree with the capacious and precise definition of the polysemantic nature of any ancient object with vertical exposition given by S.I. Adzhigaliev· "each construction (sign post, pagoda, mausoleum, etc) can theoretically be a carrier of several semantics: a world tree, a sacrificial post, a model of the world (dwelling), etc." (1994: 113).

Hence the evidence Hudiakov and Kim gave against the hypothesis put forward by Kubarev is not persuasive; on the contrary, the findings in the Alkaak enclosures once again support the correctness of his conclusions and validity of his reconstruction of the memorial ritual of the Ancient Turkic population in Altai.

Balbals: symbols of killed enemies or hitching posts?

More than 20 years ago, V.D. Kubarev first suggested an untraditional interpretation of the Pazyryk and the Turkic *balbals* (1979a: 93 – 96; 1984: 66 – 69, fig. 16; 1997: 21 – 25) which was not accepted by many researchers (Kliashtorny, Savinov, 1994: 122; Voitov, 1996: 85; etc.). However, many other archaeologists have actually corroborated his hypothesis by their own discoveries and new research, thus giving this hypothesis the right to existence (Aseev, Kirillov, Kovychev, 1984: 24; Shulga, 1989: 42, Olkhovsky, 1989: 59; Ermolenko, 1991: 168; Adzhigaliev, 1994: 138 – 143; Ovchinnikova, 1998 208; Kiryushin, Tishkin, 1997: 58; Vadetskaya, 1999: 16, etc.)

Somewhat later and independent of our research, S.S Sorokin presented his opinion on the semantics of the "beyond the burial mound" monuments first in a thesis form and then in a detailed article (1979: 115; 1981). It is worth noting here that Sorokin, having made a reference to a little known publication of P.P. Khoroshikh (1972) in the Mongolian archaeological magazine, agreed with his explanation of the purpose of rows of deer stones interpreted as *serge*, i.e., hitching posts used for tying horses. Thus, in Sorokin's opinion (1979: 115), deer stones could have served as hitching posts. It is not clear, though, why he thought that Kubarev held to the same point of view (Sorokin, 1981: 39, ref. 44). Not paying attention to this inaccuracy, Voitov referred Kubarev to the group of those Siberian archaeologists who had developed the hypothesis, suggested by Khoroshikh and Sorokin (Voitov, 1986: 85). In connection with this misunderstanding, Kubarev's colleagues should be reminded once more of his opinion about the semantics of the deer stone. He sees in them the images of "particularly highly respected, heroic ancestors" (1979: 86), not the images of tethering posts. Sorokin attributed *balbals* to objects that are not "units for counting the enemies personally killed by the buried. Rather *balbals* are the monuments of participation, a sign of the presence of relatives of the dead, fellow tribesmen and even members of other tribes at the solemn burial ceremony" (1981: 37). In his next work, Sorokin tried to unite all "beyond the burial mound" monuments – sign posts, deer stones, enclosures, sculptures, *balbals*, etc. – coming to the conclusion that "all these monuments come close to *serge* in all the diversity of their semantics and – most importantly – in their meaning of home, family hearth" (1987: 16). As a result of his reasoning, Sorokin did not strictly determine the functions of indissoluble elements of the memorial complex, having come to the conclusion that "they referred to the activity of people, not to the burial or memorial ritual" (Ibid.: 13). Such a conclusion seems to be logical since the goal of the researcher was to reconstruct the original view of the burial-memorial constructions and the ideological notions of the ancient and medieval Central Asian nomads associated with them.

By way of justification and support of the commonly accepted point of view on the semantics of rows of stone *balbals* by the enclosures and kagan's memorials as symbols of killed enemies, Voitov suggests an anthropomorphic character of some of the *balbals* (1996: 87 – 88, fig. 50, *1, 2,* 52, 53) Undoubtedly, though, all of them represent Ancient Turkic sculptures and only in the second place were they placed in a row of *balbals*. Even Voitov states that "fragments of deer stones were sometimes used as anthropomorphic *balbals*" (Ibid.: 86). For this reason it is not clear why Voitov, like A.D. Grach* (1955: 429 – 430), calls them "the main *balbals*" (Voitov, 1996: 86 – 88). It was proved long ago that "the main *balbals* or the main steles" are functionally identical to the Turkic sculptures erected by the eastern side of the enclosures (Kyzlasov, 1969: 26; Kubarev V.D., 1979a. 24 – 27; 1979b: 154; Hudiakov, 1985: 182; Plotnikov, Hudiakov, 1987. 195). Using logical reasoning and following the terminology suggested by Voitov, we come to the conclusion that "the main anthropomorphic *balbal*" substituting the sculpture is the "main enemy" put first in a row of other *balbals*, "ordinary enemy warriors." But this is already another hypothesis according to which a sculpture, stele or a deer stone could represent a mighty enemy (Veselovsky, 1915; Grach, 1955: 428 – 431; Albaum, 1960, etc.). This hypothesis has become the key concept of Grach and it was explained in detail in his book on the Ancient Turkic sculptures in Tyva (1961).

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* As it follows from a collective monograph on the Turkic sculptures in Tyva, A.D. Grach has changed his mind and writes that "the main steles . are synonymous with sculptures" (1961· 54 – 55).

The author persisted in his opinion, but the scientific discussion did not finish in his favor. Two reviews of his book concluded the discussion about the function of the Turkic sculptures and *balbals* that had been going on for over a hundred years (Kyzlasov, 1964; Sher, 1964). At that time Y.A. Sher wrote that the fragments from the Chinese chronicles "describing the Turkic burial ceremony confused many archaeologists studying the stone sculptures. It should not be forgotten that all the fragments of texts describing the *balbals* have considerable lacunas before and after their description. These lacunas make it difficult or even impossible to perform the semantic reconstruction of texts" (1964: 356).

The fact that we did not accept the written sources explaining the function of *balbals*, as well as their new interpretation, made Voitov disagree since he thinks that this hypothesis cannot be supported by archaeological evidence (1996: 85). Without entering into discussion about this problem, he nevertheless accepts explanations that seem strange to us of the Ancient Chinese as to the function of the *balbals*. Here he finds perspectives to further develop the idea of still another function of these stones; namely, as a marker of the placement of the remnants of sacrificial animals (Ibid.) (see also (Sorokin, 1981: 37)). If such an interpretation of the Chinese text were taken literally, then it would turn out that the skulls of horses and sheep – brought as a sacrifice to the deceased – were also put or hung on the *balbals* (or "landmarks" according to the Chinese sources), i.e. on the heads of the enemies, since the *balbals* symbolize the murdered enemies. An uncritical acceptance of the Chinese chronicles resulted in such statements as "the skulls of animals were hung on the *balbals*" (Hudiakov, 1985: 180).

When studying the Altai *balbals*, Gumiliev pointed out two different shapes of the upper parts of the stones: "peaked and flat… here an important ethnographic feature is set off, namely, the headgear. Steppe dwellers wear peaked malakhai [fur cap with large ear-flaps – *Authors' note*] to this day, while the Altai people wear a flat round hat… when the Turks came to the Altai in the 7th century, their enemies were the indigenous Altai peoples on the one hand and the steppe tribes, the Kazakh ancestors, on the other. It is evident that in the 7th – 9th centuries the Turks had to fight with their enemies on two fronts, which found its reflection in the depiction of *balbals*. If this is true, then it could be pointed out that the fight with the steppe was more successful, since out of 486 *balbals* that were studied 329 were peaked, while the number of flat-headed ones reached 157" (1963: 261). The premise made by Gimiliev is subjective, deriving from his desire to see a human figure in the *balbal*. This explanation attracted Voitov's attention, who – as has been mentioned above – also distinguishes anthropomorphic features in the Mongolian *balbals*. Our own observations of hundreds of *balbals* made both in the Altai and Mongolia demonstrated that the majority were actually selected according to shape and height: small crude stones of not more than 0.5 m in height were, as a rule, tetrahedral or rectangular in section (Fig. 21). If no appropriate block could be found nearby, then elongate stones and even boulders were used. The upper parts of *balbals* displayed various shapes, which were not associated with different shapes of headgear.

It is logical to suppose that the sculptures showing arms (for example, a broadsword, a sword or a dagger) must be erected by the *balbals*, "enemies" killed by the deceased. But this is not so. For example, at the memorial complex of Ayuta in the Kosh-Agach region in the Altai (see Fig. 20), where two sculpture images of noble Turkic warriors were found, a total of 46 *balbals* were found near the southern sculpture, while there are no stones by the northern ones. At present 286 sculptures are recorded in the territory of the Russian Altai. If we exclude the displaced sculptures, the ones exhibited in museums, as well as those lost, which together comprise 104 samples, then from 182 sculptures *in situ* only 58 stone figures are accompanied by a row of *balbals*. Among them there are 15 sculptures showing arms. Still, twenty other stone figures of armed warriors standing by the eastern side of the Altai enclosures were not accompanied by *balbals*. Thus it can be concluded that the *balbals* were more often erected by the sculptures which did not show arms. Our own observations show that the rows of *balbals* located near non-processed stele substituting the sculptures are much more numerous. All the above makes it possible to doubt the interpretation of *balbals* as symbols of the killed enemies and actually only strengthens our version as to their purpose and application as "eternal" hitching posts *. A new argument could also support our hypothesis. It is the presence of a hole in the upper part of a *balbal* which is still standing in a row of similar stone tethering posts in the Jolin I burial ground (in the valley of the Yustyd River, the Russian Altai). Undoubtedly this stone with a natural hole was purposefully picked up for the quite utilitarian purpose of tying horses' reins while the memorial rite was being performed (Fig. 22). The authors have also investigated the stone tethering posts which are more often found by the southern side of the winter dwellings of Mongolian Kazakhs and Tuvinians (Kubarev V.D., 1997: 24; Kubarev V.D., Lee Heon-jong, 1999: 76). It is possible that some of the stone tethering posts were erected as early as the 3rd – 2nd millennia BC and have been preserved to the present. They were an indispensable part of the winter camps of nomadic cattle-breeders protected by the mountains from bad weather. In these well-chosen places wooden dwellings were built, and though they were destroyed with time, eternal *serge* stones have served generations upon generations of nomads, being used in their direct function of tying horses.

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* For a detailed discussion in favor of *balbals* as hitching stones see (Kubarev V.D., 1979a: 93 – 96; 1984: 66 – 69; 1997: 21 – 25; Kubarev V.D., Lee Heon-jong, 1999: 74 – 83). V.D. Kubarev managed to model the supposed position of horses by the *balbals* during the celebration of the "shepherd day" held in the ancient burial field in the Jolin area (Kosh Agach region of the Republic of the Altai). About a dozen horses tied to the chains of the ancient *balbals* were photographed (Fig. 22). These pictures were later demonstrated at several regional conferences. Such an idea resulted from a discussion between the author, L.R. Kyzlasov, and I.L. Kyzlasov, who claimed that the horses could not be placed by the *balbals*, because there is only a small distance between the stones.

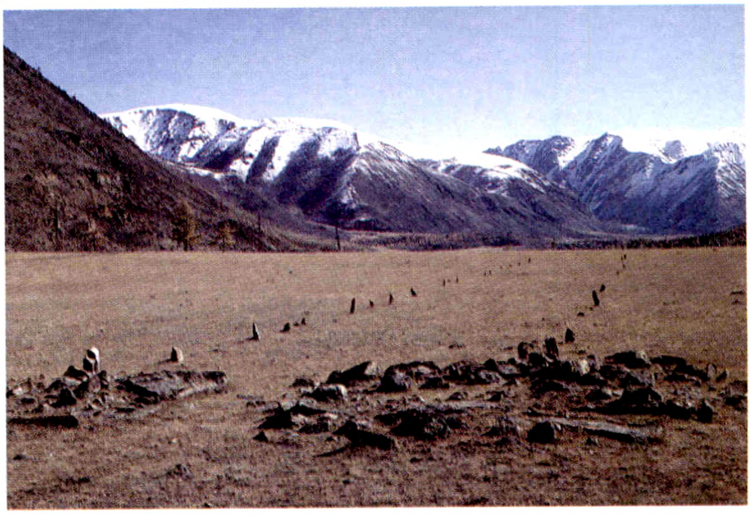

Fig. 21. Ancient Turkic memorial enclosures with rows of *balbals*. The left bank of the Chuya River (Russian Altai).

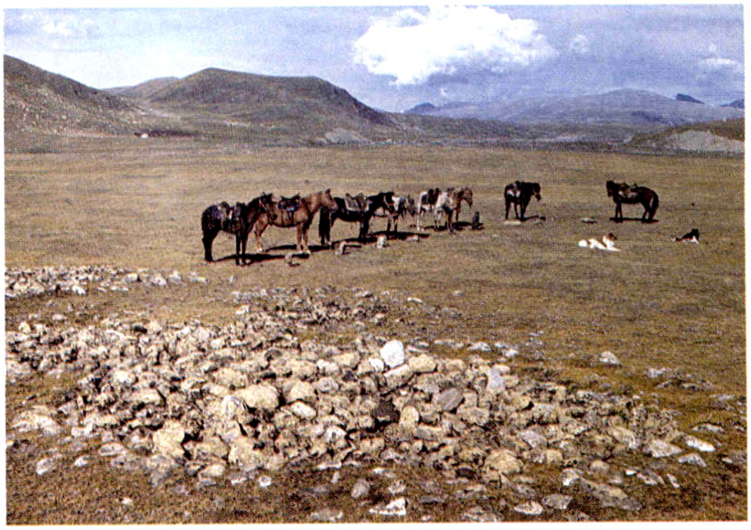

Fig. 22. Horses near the *balbals*-hitching posts. A model of one of the stages in the memorial rite of the Ancient Turkic people. The Djolin area (Russian Altai).

Semantics of the memorial monuments

As it is known, the majority of Turkologists long ago arrived at the conclusion that the monuments under study are memorial constructions. This has been done on the basis of written, ethnographic and – more importantly – archaeological sources. The assumption of other researchers that the Ancient Turkic enclosures served as a burial place according to the ritual of burning the body of the dead does not stand. This is due not only to the absence of support by the results of excavations, but also insubstantial reasoning on the part of the authors. Along with Potapov (1953: 18 – 19) and Gumiliev (1959: 112), Surazakov is an adherent of this concept. But possibly under the influence of our criticism (Kubarev V.D., 1995: 158), he has become less categorical when talking about the purpose of the Turkic memorial enclosures. In one of his recent articles Surazakov suggests a new, compromising solution to the problem, allowing for the "possibility to unite two extreme points of view and define the Ancient Turkic enclosures as the monuments with burial and commemorative purposes" (1993: 51).

Criticizing the special opinion expressed by Gumiliev about the remnants of cremated ashes in the enclosures, Mogilnikov correctly supposed that it was not supported by archaeological evidence (1981: 31 – 32). But in his next publication Mogilnikov did not rule out the possibility "of using some small part of enclosures for the burial," finally arriving at the conclusion that "their purpose has in many aspects remained a mystery to science" (Mogilnikov, 1992: 193). It is probably impossible to unequivocally claim at the present time that all the Ancient Turkic enclosures served as places for memorial services, being copies of memorial temples or symbolic models of the Ancient Turkic dwelling. New evidence and reasoning, to be presented in our next publication, bears witness to this.

Conclusions

The study of the Ancient Turkic memorials in the Mongolian Altai makes it possible to claim that they are identical to similar monuments in the Russian Altai. All types of Ancient Turkic enclosures, having been earlier singled out as memorial constructions discovered in Gorny Altai (Kubarev V.D., 1984: 50), are in complete correspondence with the Mongolian materials. The stylistic unity of the Turkic graffiti in the territory of the Mongolian and Russian Altai should be noted as well as the presence of the same Ancient Turkic *tamgas* (personal or family marks) left by kindred families. It seems likely that the natural border of the highest mountains of the Altai did not pose a formidable obstacle to the ancient population of the two regions. Hence it seems quite evident that geographically the Altai presented a culturally and ethnically unified province of the Ancient Turkic oecumene.

These are the brief results, achievements and discoveries of the research conducted over a 20-year-period in one of the most interesting fields of the Ancient Turkic culture – monumental art of the ancient Central Asian populations.

The universality of the world view concepts and the diversity of religious cults of the Turkic peoples of Central Asia have been reflected in a large variety of memorial constructions, the study of which must continue on a large scale. The solution to problems of the genesis and chronology of the memorial complexes, presently undergoing a process of rapid deterioration, and the reconstruction of the ideological views of the Ancient Turks in many ways depends on further archaeological excavations.

A brief list of memorial monuments examined by the Joint Russian-Mongolian-American Expedition

Five kilometers upstream from the mouth of the Khara Us River, on the right bank of the Tsagaan Us River (the northern foot of the Shiveet-Khairikhan Mountain located at 49°07' N, 88°15' E), three archaeological complexes have been discovered. They include kereksurs, kurgans of the Scythian period, steles located within enclosures as well as Ancient Turkic memorial enclosures with and without sculptures. The memorial presenting a meridionally oriented row consisting of four enclosures with four sculptures and *balbal* chains holds the greatest interest.

Sculpture 1 (southern) (see Fig. 3), 100 × 38 × 15 cm. A gray shale slab was used*. It presents a realistic sculpture. All the details are modeled in high relief. The facial features are distinct with the eyes, moustache and mouth being deeply impressed; other features, including the hands, a vessel and waistband are distinct, too. The posture is canonical: there is a vessel in the shape of a goblet in the right hand, while the left hand rests on the broadsword's handle. Rectangular metal plates may be distinguished on the waistband, on the right side there is an image of a small bag (with a steel for striking fire?). A slit in the outer-clothes and a small headgear are also shown. The sculpture faces east and stands by the enclosure (3 × 3 m), which is filled with heavily turfed boulders. Five kilometers to the east of the sculpture a ring 1.3 m in diameter made of nine stones has been found. A row of *balbals* with the number of stones exceeding twenty and the length of 120 m is erected in the same direction.

Sculpture 4 (northern) (see Fig. 4), 80 × 35 × 15 cm. A grey shale slab was used for the sculpture. It is realistic in character and was made with great skill. The head projects from the monolith; the shoulders are exposed. The technique of deep pecking was used; the eyes and mouth were engraved. The right hand supports a vessel in the shape of a goblet with its base at breast level. The left hand rests on the sabre hilt. Rectangular metal plates can be distinguished on the waistband with a scabbarded sabre hanging from the left side on two waist-belts. On the figure's right side a small bag (with a steel for striking fire?) is seen. The sculpture faces east and stands by the enclosure (3 × 3 m), which is filled with heavily turfed boulders. Four kilometers to the east of the sculpture a ring-shaped layout consisting of seven stones, 1.2 m in diameter, has been found. A row of three *balbals* is erected in the same direction.

Single sculpture (see Fig. 5) has been found 11 kilometers west of the Sagsai somon (village) by the foot of some small hills. It is made on a rounded yellow shale (?) slab (135 × 44 × 23 cm). It differs from other Turkic sculptures because of the depiction of a larger vessel on a base held in both hands at the stomach level. The enclosure next to the sculpture, or even its traces, has not been detected. It was published by D. Bayar and D. Erdenebaatar (1999: sculpture 44).

In the valley of the Mogoi River (the right tributary of the Kobdo River) six Turkic sculptures and more than a hundred memorial enclosures (48°43' N, 88°34' E) have been found among other archaeological objects.

Sculpture 2 (see Fig. 6), 120 × 40 × 18 cm. It is carved on a gray granodiorite block. A head with broad, Mongoloid face slightly projects from the monolith, while the shoulders are partly designated. There is a small goblet in the sculpture's right hand at the breast level. The left rests on the waistband shown as a roll. The sculpture stands by the left side of the enclosure (3.1 × 3.4 m). A row of *balbals* consisting of five stones stretches for 40 m in the eastern direction from the sculpture.

Sculpture 6 (see Fig. 13), 175 × 47 × 20 cm. It is carved in marbleized limestone A disproportionately large (relative to the body) head is very thoroughly completed. The headgear in the form of a small rounded hat is shown. The clothes' lapels (a fur collar?) are modeled in high relief. The arms cannot be seen distinctly, possibly due to damage. A relief waistband is made of squared plates. The sculpture is erected by the eastern side of the enclosure (2.3 × 2.3 m) composed of shale slabs and filled with white quartz boulders To the east of the sculpture there is a row of nine stone *balbals* stretching for 50 m.

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* The identification of all rocks used for sculptures described here was performed by V.A. Gavrilov, Department of General and Regional Geology, Novosibirsk State University.

In the Ikh-Turgnii-Gol area opposite the Syrgal river crossing (48° 33' N, 88° 25' E), members of the expedition have studied a series of five Turkic sculptures that are well-preserved.

Sculpture 1 (see Fig. 7), 89 × 42 × 12 cm. It is made of white granite. It presents a realistic and skilfully carved sculpture. The head had been chopped off, and was found close by. All the details are modeled in high relief The facial features, hands, the vessel and waistband are distinctly seen. The posture is canonical: there is a vessel in the figure's right hand, while the left hand rests on the waistband. The waistband shows rectangular metal plates-settings. A detail of fur (?) clothes, the collar, may also be distinguished. The sculpture faces east and stands by the enclosure (3.2 × 3.2 m).

Sculpture 3 (see Fig. 8), (135 × 60 × 20 cm). It is made of porphyraceous granite. Hands, a vessel, a waistband and a small bag (with a steel?) are distinguishable. The head had been chopped off, and was found close by. The posture is canonical: there is a vessel in the figure's right hand, while the left hand rests on the waistband. A clothes detail, the collar of the robe, is also shown The robe has a deep fold, with the left flap on top. The sculpture faces east and stands by an enclosure 5 × 5 m. The enclosure is filled with boulders and detritus. It is square-like in shape and is surrounded by a bank and a ditch, both of which are 2 m in width (see Fig. 17). A row of twenty-one *balbals*, stretching for 150 m, lies to the south-east of the enclosure.

On the small river Shar Bulak (near the north bank of Lake Khurgan Nuur), a memorial complex was discovered (48°39' N, 88°37' E) It includes an early medieval memorial of the Turkic nobility and common memorial enclosures. Of special interest is a construction, occupying a large area of 19 × 12 m, on a small platform surrounded by a bank and a ditch. There are two exits in the eastern part of the memorial Inside there are three common memorial enclosures (4 × 4 m) with two broken stone sculptures. To the east of the memorial there is a chain (oriented along the S – N axis) of 12 stone rings and two rows of *balbals*, consisting of thirty-nine and forty-three stones respectively. They are situated 150 m away from the enclosure. Another well-preserved sculpture (N 3) is situated 150 m to the north of the described memorial.

Sculpture 3 (see Fig. 9) with the dimensions of 175 × 50 × 25 cm. It presents a rather realistic sculpture carved from a slab of white fine-grained granite. An oval-shaped head projects from the monolith; the shoulders and hands are designated. A goblet with a tall stem is shown in the hand of the right arm, bent at the elbow. The left hand rests on a relief waistband with a bent sabre hanging from it on two waist-belts (the sabre skirts the figure's left side). There is a small bag (with a steel?) of volute shape and an oblong object (whetstone?) The sculpture stands by the eastern enclosure (5 × 5 m) filled with quartzite boulders and small pebbles. To the east of the statue there is a row of fifty-five *balbals*, which stretches for 230 m.

On the south-western bank of Lake Dayan Nuur (48°19' N, 88°55' E) a large complex consisting of two Ancient Turkic enclosures has been discovered. By the eastern side of one of them a stele is erected, by the side of the other one there is a stone sculpture.

Sculpture 1 (see Fig. 10), 156 × 40 × 19 cm. It is a realistic and skillfully carved sculpture made of a dark-gray, fine-grained slab. All the details are modeled in high relief and can be clearly seen. The neck and shoulders are outlined. Such facial features as eyes, nose and mouth are carved with special care. The ears shown in relief are complete with earrings with pearl (?) pendants; the hair is plaited (?) On the sculpture's neck, a necklace with a trefoil amulet is depicted. The waistband is shown as a single relief stripe. From the top and bottom on both sides of the figure, there are the same kind of stripes, but criss-crossed, while at its front on their left and right there are vertical stripes-"plaits." The sculpture faces east and stands by a stone enclosure (5 × 5 m) that can hardly be distinguished. Materials were published by G.N. Potanin (1881: 72 – 73, fig. 34).

On the southern bank of Lake Khurgan Nuur (48°32' N, 88°27' E), a memorial complex has been discovered. It lies 2 to 3 km to the east of the objects in Ikh-Turgiin Gol. The stone sculptures are erected near the enclosures that are oriented along the S – N axis (see Fig. 11). All the enclosures are made of slabs and filled with boulder and white quartzite pebbles

Sculpture 1 (southern) (see Fig. 12), 135 × 55 × 25 cm. It is made of a monolith of white coarse-grained rock with black quartzite inclusions (micaceous gneiss). It is broken in two places (the neck and the waistband). It is a round sculpture. All the details are modeled in high relief. The posture is canonical: there is a vessel in the right hand, the left hand holds the broadsword's hilt. The lapels of the robe may be distinguished as well as a small hat. Rectangular metal plates are depicted on the waistband; there is a small bag (with a steel?).

In 1998, in the Aral Tolgoi area on the western bank of Lake Khoton Nuur (48°44' N, 88°08' E) a small but, undoubtedly, outstanding occurrence of petroglyphs was discovered. Images of various animals and birds are made mostly on horizontal planes of a small mountain ridge in the archaic contour technique; they are considerably weathered and patinated. The Aral Tolgoi petroglyphs are probably the most ancient in the Mongolian Altai. The complex includes several deer stones, nomadic kurgans and a series of Turkic enclosures with two sculptures.

Sculpture 2 (see Fig. 14), 85 × 40 × 18 cm. It is carved on a massive slab of white coarse-grained granite. The head projects from the monolith, a third of it has been severely chopped off. There is a bowl in the right hand of the figure, while the left hand rests on the hilt of a sabre or a broadsword (?) with a relief sword image at the bottom. The sculpture is erected by an enclosure (1.8 × 1.6 m) and faces east.

In the Khar Yamaatyn River valley (the left tributary of the Ikh-Oigur River), there is another memorial of the Turkic nobility (49°23' N, 88°38' E).

Sculpture (see Fig. 15), 135 × 45 × 14 cm. It is made on a slab of gray laminar slate rock. The top of the head is chopped off. The details of face, hands, accessories, and a scene at the bottom of the figure are all produced by deep engraving and are modeled in low relief. The statue is erected by the eastern side of the enclosure (4.4 × 4.6 m); it is constructed from 13 massive slabs standing edgewise. The enclosure is filled with fine stones with a large number of white quartzite pebbles The enclosure with the sculpture is surrounded by a bank 1.5 m in width and a ditch 1.5 to 2 m in width and almost square in plan (18 × 19 m). At a distance of 130 m to the east of the construction there is a row of thirty *balbals*, which turns to the north at the end

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SEMANTICS OF THE OKUNEVO CIRCULAR AND SQUARE IMAGES WITH RAYS

Introduction

Among the relics of the Bronze Age art of South Siberia, there are well-known images attributed to the Okunevo Culture of the 2nd millennium BC. Figure 1 shows a group of circular and square images with rays. It has long been assumed that these images symbolize the sun; therefore, they are known in literature as "solar symbols". However, whether this interpretation is valid remains an open question. Let us consider several well-grounded hypotheses about the semantics of these images.

E.B. Vadetskaya (1980: 65 – 67) reasonably attributed these symbols to the Okunevo art and divided them into two main types: circular images and square images. She explained the differences in the form and size of the images found at the same sites by the different time of their creation. She also believed that only one symbol depicted below an anthropomorphic image was related to the period of figurine construction. To reveal the semantics of these symbols, Vadetskaya used a wide range of analogues reported in the art of ancient and traditional Siberian cultures and proposed that the images of this group were closely connected with the image of the sun.

N.V. Leontiev noted that both circular and square images with rays were never found at the sites of the early Okunevo Culture. He distinguished the following elements in the structure of "solar symbols": (1) a circular rim with triangle cusps and (2) a central circle, which can be substituted by a smaller "solar symbol" or by a "face". He explained the possible substitution of a central circle by a "face" with the supposition that the circle symbolizes a face. To illustrate the "solar" nature of the symbol placed on the forehead of one anthropomorphic image, Leontiev used a variety of archaeological and ethnographical data (1978: 115 – 117).

A.P. Okladnikov analyzed one of the variants of this symbol (Fig. 2) and distinguished a circle and a cross as the elements of its structure. He believed that the circle was a symbol of the sun, and the cross symbolized the four cardinal points. However, in general, he assumed that the Okunevo image was a solar symbol. Okladnikov correlated a vertical design of three symbols found on one Okunevo stone figurine with a triadic structure of the whole site and connected its composition with the idea of the Three Worlds (1975: 62).

L.R. Kyzlasov based his interpretation on the fact that "the sun was depicted as a circle with four triangular beams as early as in the ancient Babylon, Mesopotamia, Syria, and in the Hittite state, and, later, in Scythia." He noted similar images in the art of Siberian peoples. Kyzlasov attributed the different positions of these symbols in the compositions of the Okunevo stone figurines to the idea of a daily movement of the sun over the sky and the Underworld (Kyzlasov L.R., 1986: 209 – 210)

However, there were other interpretations of the Okunevo symbols: they were treated as symbols of other astral bodies; namely, planets and stars (due to a large number and wide variety of such symbols on some Okunevo stone figurines) (Khlobystina, 1971a: 173, Hudiakov, 1996: 28), as a radial schematic representation of the world (because four rays could be associated with the four cardinal points) (Podolskii, 1987: 128), as maces (by a real analogue found in the Caucasus) (Kubarev, 1987: 158), and as a "sign of chakra" of the Indo-Tibetan esoteric tradition (Machinskii, 1997: 273).

Despite certain differences, in terms of methodology, these interpretations seem quite similar to one another because they are based on the analogues borrowed from different cultural traditions. However, artistic images or

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other materials of one culture can be used to explain similar artistic traditions of other cultures only if the genetic affinity of these cultures has been established (the same corresponds to decryption of dead writing systems); otherwise, the original meaning of the text studied might be substituted simply by speculations (Fridrikh, 1961: 156 – 157). Therefore, none of the hypotheses noted above can be considered valid. To obtain more reliable results, we should use primarily the informative potential of the images proper, while analysis of available analogues is more appropriate at the final stage of investigation. This approach to studying the Okunevo "solar symbols" has been used in recent years (Esin, 2000a: 112 – 120, Leontiev, 2000b: 33).

Description and classification of the Okunevo symbols

Results of comparative analysis show that circular and square Okunevo symbols are complex images, which include the following elements that are of independent significance in the Okunevo artistic system: an outer circle, central circle, and rays. A classical Okunevo design includes a circle and four rays composing the outer triangular cusps, which are oriented toward the common center shown by a smaller circle (see Fig. 1, *1*). Yet, some elements and their number in complex images can be different.

The most substantial difference among the images of this type is their form: they can be either circular or square (see Fig. 1, *11 – 15*). In some cases, the outer square is composed of four concave arcs and does not have any rays (see Fig. 1, *14, 15*). Mostly, the contour of the outer circle or square is shown by a single line, but in some cases, it is shown by a double or even triple line (see Fig. 1, *10, 12, 15, 20*; 3, *4*).

The rays of the Okunevo "solar symbols" can be different in form. The most common are the rays composing cusps that look like triangles with the bases formed by the image contour (see Fig. 1, *1*). Some triangular cusps are produced in the silhouette technique in contrast to those noted above (see Fig. 1, *8, 21*)

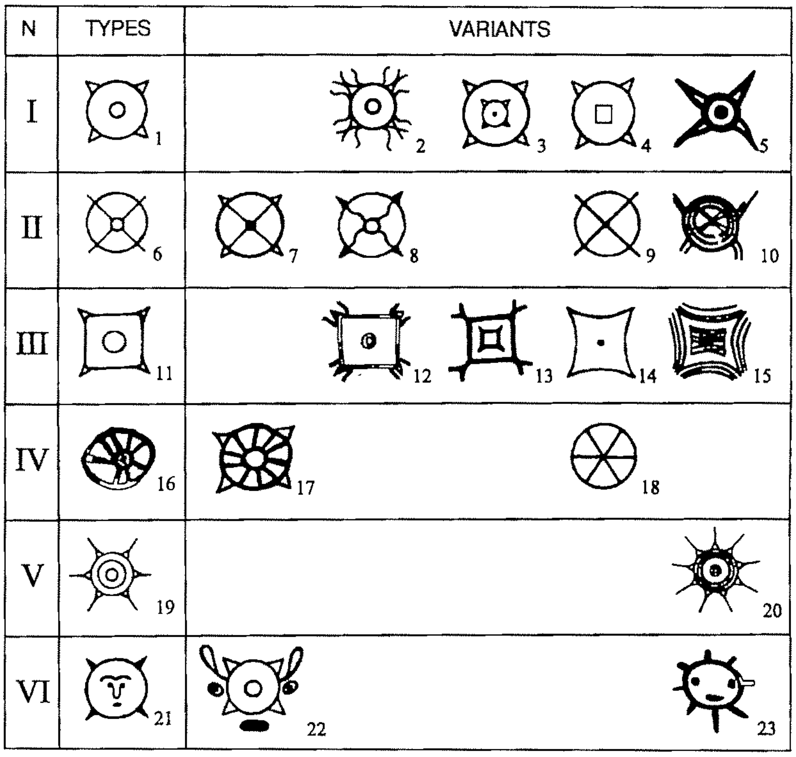


Fig 1. Classification of the Okunevo cosmic symbols
1, 2, 3, 11, 13, 14, 21 – after E B Vadetskaya (1980 plates XLII, *67*, LI, *111*, XLVIII, *99*, LII, *115*, XLVII, *91*, XXXIV, *25*), *6 – 8, 10* – after N V Leontiev (1978 fig. 4, 6; 2000b fig. 1, *2*); *9, 18* – after L R Kyzlasov (1986 fig. 158, *86*), *12, 15* – after I P Lazaretov (1997 plates XIV, *3*, XXX, *1*), *16, 17* – after D G Savinov (1997: plate II), *19, 20* – after A.N Lipskii (1952 fig. 27, *4*, *5*)

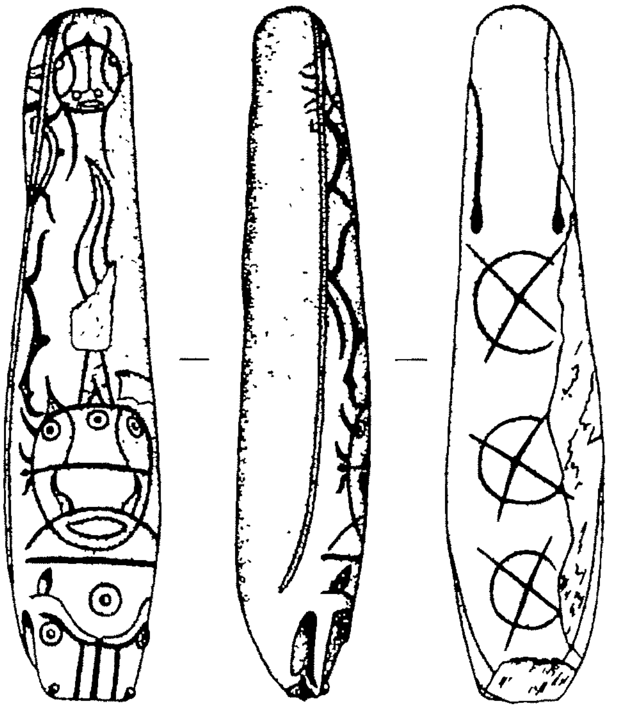


Fig 2 Miniature figurine in the form of a serpent (Kyzlasov L.R , 1986. fig. 138)

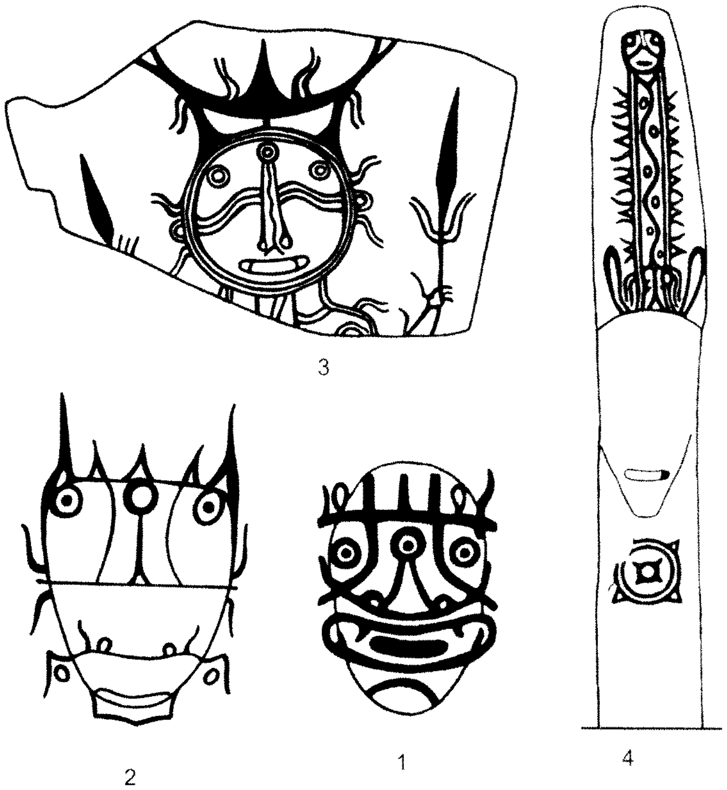


Fig. 3. Symbols of a cosmic pillar with a sign of the heaven on the top.
1 – symbol on an egg-shaped stone from the Uibat River (Vadetskaya, 1980: plate LIII, *122*); *2* – symbol on the figurine found at Mayaki village (Ibid.: plate LV, *147*); *3* – stone slab from the Chernovaya VIII burial site (Ibid.: plate LII, *114*); *4* – stone figurine from the Askiz River (Leontiev, 2000b: fig. 1, *5*).

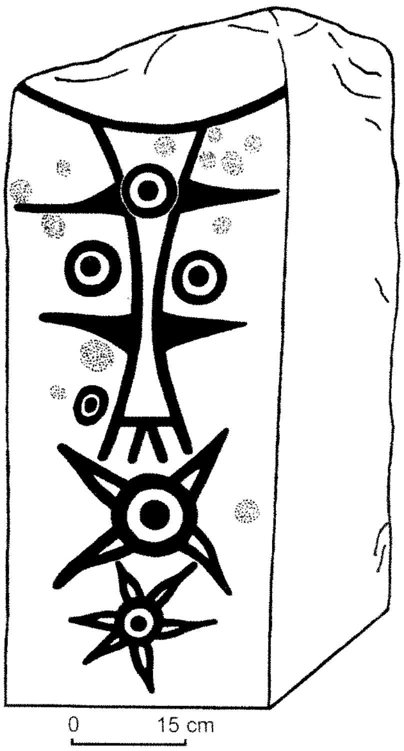


Fig. 4. Stone figurine from the Utukh-Khaya-Kiste site (found by Y.S. Hudiakov, deposited with the Institute of Archaeology and Ethnography, SB RAS, Novosibirsk).

The straight rays coming out of the outer circle are often seen (see Fig. 1, *6, 23*). Vertexes of the cusps can end with either two or even three lines. In some cases, a bull-horn pattern can be seen on the rays (see Fig. 1, *2*). The rays that are formed by double straight lines have two pairs of "horns" (see Fig. 1, *12*). There are some cusps with a straight line coming out of their vertexes, which resemble a snake's tongue (see Fig. 1, *5, 19*).

Some images have straight (see Fig. 1, *6*) or wavy (see Fig. 1, *8*) rays coming out of the center. These rays can also be formed by double lines, similarly to the rays forming cusps mentioned above (see Fig. 1, *10*). In some cases, a combination of the internal rays with the outer cusps characteristic of the classical variant can be seen (see Fig. 1, *7 – 8, 17*).

The rays of "solar symbols" differ not only in their form, but also in their number. In most cases, each symbol has four rays. However, there are some symbols with six, eight, or even nine outer rays. For this variant, the most typical are the rays in the form of a snake's tongue (see Fig. 1, *19, 20*; 4), although the rays forming cusps or simply straight rays are also possible (see Fig. 1, *23*). The symbols can have six, eight, or ten internal rays (see Fig. 1, *16 – 18*).

The center of "solar symbols" is denoted by a circle pecked by the contour or shown in silhouette (see Fig. 1, *7, 8*), a smaller "solar symbol" (see Fig. 1, *3, 13*), or a square (see Fig. 1, *4, 15*). In some cases, a double circle (see Fig. 1, *12, 20*) or several concentric circles (see Fig. 1, *19*; 5) mark the center.

There are some symbols showing certain anthropomorphic features, such as eyes, a mouth, and a nose. It should be noted that the eyes and the mouth could be placed either inside or outside the image. In addition, these symbols are sometimes supplemented by bull horns and ears, which are typical elements of the Okunevo anthropomorphic images (see Fig. 1, *21*; 4) (Vadetskaya, 1980: plate XLVIII, *96*).

The main criteria for differentiating the Okunevo solar symbols are: the form of a symbol (circle or square), the number and position of the rays (four rays or more than four rays placed inside or outside the symbol), and the anthropomorphic elements (presence or absence). Using these criteria, six main types of the known Okunevo symbols can be distinguished (see Fig. 1).

Most solar symbols were found on stone slabs and figurines (the later differ from slabs by their column-like form), which were used for ritual purposes. Almost all images were pecked on stones, although some images

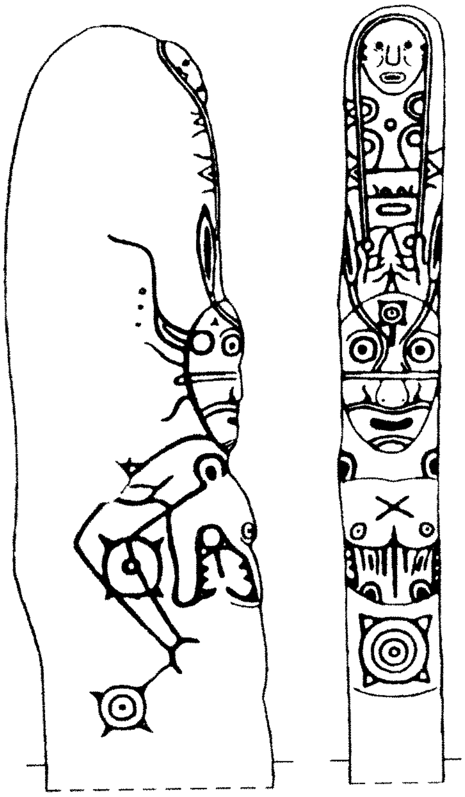


Fig 5. Stone figurine from the Lake Shira region (Leontiev, 2000b: fig. 1, *4*).

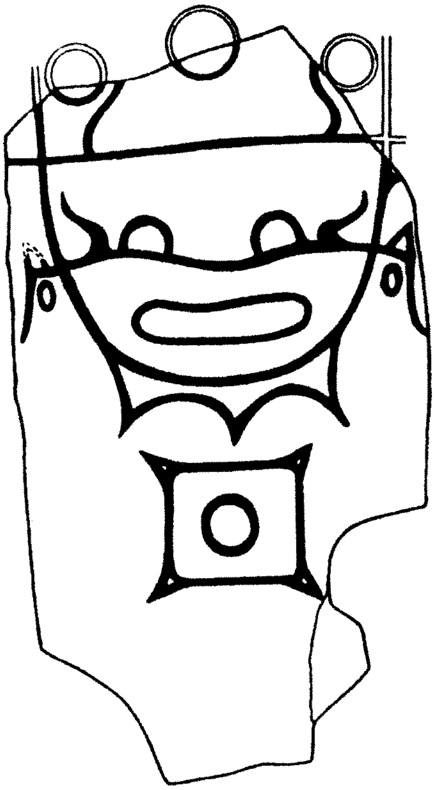
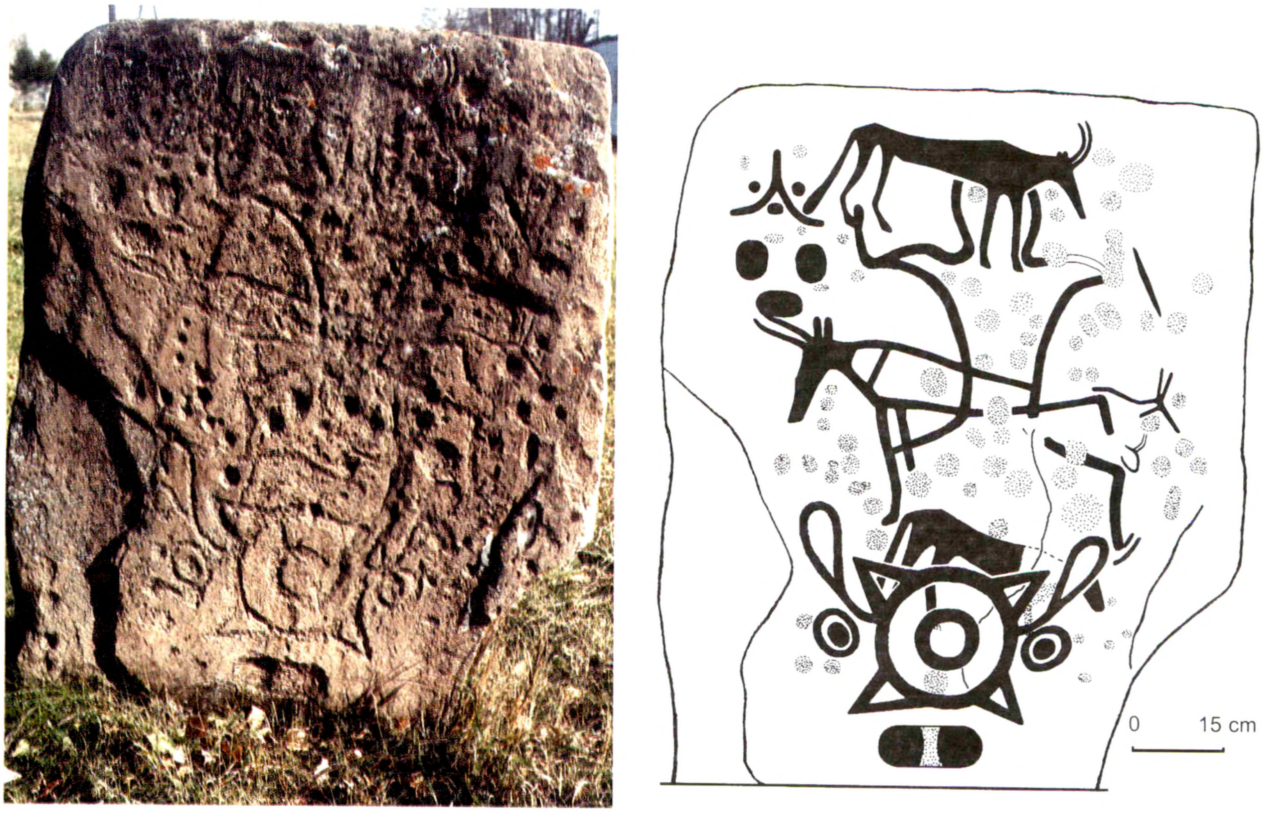


Fig. 6. Stone slab from the Chernovaya VIII burial site (Vadetskaya, 1980: plate LII, *115*).

were colored in red ochre (Ibid.: 65; Kovalev, 1997: 87). As a rule, "solar symbols" were involved into more complex compositions in which they occupied certain places. For example, the most typical position for "solar symbols" of all types is below the anthropomorphic images, which confirms the semantic integrity of all these types. There is one "solar symbol" below each anthropomorphic image pecked on the slabs (Fig. 6). For example, there is a "solar symbol" below a full-size anthropomorphic figure depicted on a stone slab from the Bolshoi Tabatskii barrow (Fig. 7), although all the images on this slab correspond to different periods. The earliest was the anthropomorphic image whose specific features suggest that it depicts a female (Kovalev, 1997: plate VII, *3*). There are three large animals shown above the female image, one below the other, that probably symbolize a sacrifice. Another "solar symbol" can be seen in the lower part of the slab. The addition of new figures to the existing compositions is typical of the Okunevo art and suggests that these images were created for specific rituals and were in use for a rather short period.

Most commonly, one solar symbol was depicted below central anthropomorphic images (see Fig. 3, *4*; 5). However, in some cases, two (see Fig. 4) (Savinov, 1997: plate II) or even three symbols (Vadetskaya, 1980: plate XXXVIII, *47*) were depicted in the lower parts of the Okunevo stone figurines. Such combinations were not found on the slabs, and some of these symbols differ in their sizes as well as in their forms. Therefore, it may be supposed that extra symbols could be added after the construction of an entire figurine, and they were connected with the further use of this figurine for ritual purposes. Side surfaces of stone figurines also often contain "solar symbols". There could be several "solar symbols" placed one below another. A stable design found on the side surfaces includes three symbols, almost identical to one another, which were produced simultaneously at the moment of construction (Ibid.: plates XXXV, *33*; XLII, *67*, etc.) The composition consisting of three symbols can also be seen on the backs of the stone figurines (see Fig. 2). However, most often, the back and front sides contain a "solar symbol" in their lower parts. Solar symbols (see Fig. 1, *1*, *13*) are sometimes seen on tops of Okunevo stone figurines (Ibid.: plates XLVIII, *95*; XLIII, *71*).

It should be noted that "solar symbols" on the Okunevo stone figurines seem to be compositionally connected with the image of a serpent. For example, one or even two serpents (see Fig. 2) were depicted above the "solar symbol" on the rear side of a figurine (Leontiev, 1997: fig. 10). On the front surface, under the "solar symbol",



1

2

Fig. 7. Stone slab from the Bolshoi Tabatskii barrow (found by M.N. Pshenitsyna, deposited with the Museum of the Institute of Archaeology and Ethnography, SB RAS, Novosibirsk). *1* – photograph; *2* – drawing.

a serpent's mouth was often depicted. For example, there is a similar design in the lower part of a stone figurine from Lake Belë in Khakasiya (Vadetskaya, 1980: plate LIV, *140*). Here one can see the lower part of a solar symbol shown with a double line right under the serpent's head: the solar symbol has two remaining cusps with "horns" on their sides, and each cusp ends with three lines. The upper part of this symbol is hidden inside the serpent's mouth as if the serpent is trying to swallow it or, on the contrary, give birth to it. Two solar symbols found on a figurine from the Lake Shira region, Khakasiya, are depicted near the serpent's foreleg and its head shown in profile (see Fig. 5). The presence of an individual symbol near the serpent's mouth on the side surface suggests that the profile depictions of this zoomorphic deity can be regarded as two independent images (Ibid.: plate LI, *111*). Obviously, "solar symbols" are closely connected to the image of a hand ending with a small arc, and this arc symbolizes an open serpent's mouth, because in some cases there is a realistic serpent's head depicted at the hand's end (Esin, 2001: fig. 1). A design of one or two arcs placed above the solar symbol often substitutes the whole depiction of a serpent's mouth (see Fig. 6).

A stone figurine deposited at the Abakan Museum and a slab from the Byrkanov burial site both have a "solar symbol" in the center of an anthropomorphic face (Vadetskaya, 1980: plate LV, *145*; Studzitskaya, 1997: plate II, *5*). There is a single example of a "solar symbol" placed as a "third eye" on the anthropomorphic face of the Shira stone figurine (see Fig. 5). A "solar symbol" is found on the stone figurine from Verkhnii Askis village, on which it is depicted right above the anthropomorphic face overlaying the main design (Esin, 2000b: fig. 3).

One "solar symbol" was cut on a rectangular stone plate, which served as an element of a costume (see Fig. 1, *12*). This plate could be used as a belt buckle (Lazaretov, 1997: 30), and the symbol was worn in the abdomen area, which correlates well with the position of "solar symbols" in the lower tiers of stone figurines and slabs (see Fig. 5).

"Solar symbols" can be often seen on the outer surfaces of the bases of the Okunevo vessels (see Fig. 1, *15*). A ritual vessel of a biconical shape (an incense burner) found in a grave near the Askiz River has two "solar symbols": one is scraped on the outer surface and another one, on the inner surface of its base (see Fig. 1, *19, 20*). Symbols with numerous rays, analogous to the "solar symbols" of

Type V, can be seen in the development of a pattern decorating the body of some Okunevo vessels. A decoration pattern on a vessel from the Uibat V burial site represents an example of such a composition: the body of this vessel is divided into three tiers by two horizontal lines, and each tier has cusps similar to those of the "solar symbols", which go round in a circle (Ibid.: plate XXII, *4*). The structure of this decoration pattern is comparable to the composition of three "solar symbols" found on the stone figurines

It should be noted that in some cases, in place of supposed "solar symbols", one can see circles without rays. This substitution is explained by the fact that the solar motif initially originated from a circle (circles without rays placed under anthropomorphic faces are found on slabs from Tas-Khazaa, the early Okunevo burial site) (Khlobystina, 1979: fig. 12, *5, 11*). Circles without rays and with a dot in the center are depicted under the anthropomorphic faces of the Okunevo period from Tyva (Devlet, 1998: fig. 3, *10, 14*; 6, *13*).

Semantics

A better understanding of the semantics of complex circular or square symbols with rays can be facilitated by an explanation of the meaning of their components, i.e., simple symbols. This can be achieved by studying simple symbols within the context of the entire Okunevo artistic system.

The main component of the symbols studied – a circle with a marked center – is analogous to the eyes of the Okunevo anthropomorphic faces (see Fig. 4). To clarify the meaning of this symbol, we consider the semantics of faces usually placed in the center of classical Okunevo stone figurines. These egg-shaped anthropomorphic faces were the first to be pecked on stones; transverse lines usually divided them into three tiers: the upper tier contained eyes, the middle tier had nostrils, and the lower tier contained the mouth (see Fig. 2). This design is a universal model typical of many cultures, which reflects the idea of three World Tiers. In terms of the Okunevo anthropomorphic code, eyes signify the light and the heaven, nostrils correspond to breath and airspace, and the mouth symbolizes death and birth and is related to the Underworld (Podolskii, 1985: 112 – 113; Kyzlasov I.L., 1987: 128 – 130; Esin, 2001: 229). The structure of an entire stone figurine corresponds to this model and its compositional principles and symbols. In particular, the composition of the upper part of the central face is identical to the structure of faces depicted in the upper tier of a stone image, because both of them have two vertical arcs (see Fig. 2; 3, *4*). The mouth in the lower part of a face corresponds to the serpent's mouth in the lower tier of a stone figurine (see Fig. 2, *5*). An egg-shaped form of the central face can be understood using the myth of the World Egg In many mythological systems, the origin of the world is related to the World Egg: the heaven originates from its upper part (the upper tier of stone figurines) and the earth originates from its lower part (the lower tier of stone figurines). As this scheme describes the development of the universe with time, there is a certain time cycle indicated on the figurines. Generally, the stone figurine is a ritual equivalent of the Cosmic Pillar or the World Mountain, which divides the heaven and the earth (Esin, 1999a· 144 – 148) Within this artistic context, we consider the circles in the upper part of an anthropomorphic image as symbols of the entire heaven and not as the symbols of individual stars, the sun or moon (Podolskii, 1985: 113; Kyzlasov I.L., 1987· 128 – 129; Leontiev, 1997: 229). The circles represent the plane of the Upper World and can be treated as a skyline or the boundary of the heaven vault.

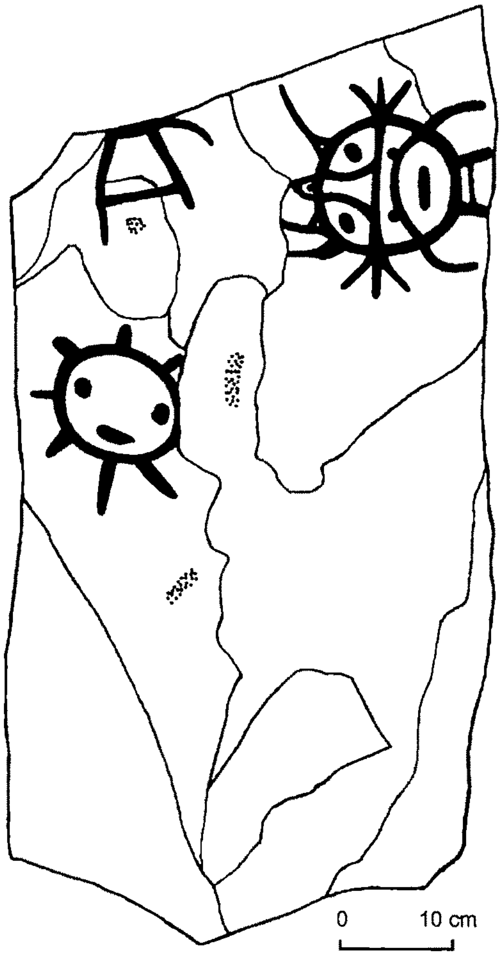


Fig 8 Stone slab from an Okunevo burial site near Lebyazhie village (found by V L Vavilenko, kept at Krasnoturinsk village).

To verify the proposed semantics of circles and explain the meaning of rays contained in "solar symbols", we consider another group of the Okunevo signs. These complex symbols consist of a circle placed on the top of vertical elements in the form of cusps, snake's tongues, or straight lines These symbols are situated in the upper parts of stone figurines or in the upper parts of anthropomorphic faces (see Fig. 3). The upper part of one of the figurines shows a full version of such symbols in which a vertical element is a serpent with a head turned down (see Fig. 3, *4*). The structure of the upper part of this stone figurine is similar to the entire image whose lower part depicts a serpent with a mouth (see Fig. 2; (Kyzlasov L.R., 1986: fig. 138)). This fact suggests that the serpent's image can be obviously identified with the Cosmic Pillar and, hence, the cusp and snake's tongue can symbolize both the serpent and the pillar (mountain). This parallels the Rigveda myths in which the serpent and the World Mountain can be identified (Keiper, 1986: 30). In some cases, the pillar is divided into three tiers, which corresponds to the three-part composition of stone figurines (see Fig. 4; (Kyzlasov L.R., 1986: fig. 65)). The cusp vertexes of "solar symbols" divided into two lines to form a "snake tongue" are analogous to the vertexes of triangular "hats" worn by anthropomorphic figures and other figures on pillars. This split vertex also may correspond to rare images of a serpent's mouth on the top of figurines (Leontiev, 1978: fig. 2, *1*; 2000b: fig. 1, *6*, *8*).

Inside the circle, on the top of one of the symbols, an anthropomorphic face is depicted with the structure analogous to that of the upper zone of a central anthropomorphic figure corresponding to the heaven (see Fig. 3, *4*). Therefore, an ordinary circle contained in the other variants of the symbols of this type and symbolizing the "third eye" (see Fig. 3, *1 – 3*) corresponds to the entire upper zone of the anthropomorphic face and signifies neither the sun nor the moon, but the heaven supported by a pillar. Since the "third eye" is equivalent to the entire upper zone of the central anthropomorphic face, it is connected with the "third", supreme heaven, where the differences between the two other heavens symbolized by the other two eyes are overcome (these two eyes can be interpreted as either the west and the east, a morning and an evening sky, etc.). In addition to the circle representing the plan of the Upper World, there is an arc on the pillar top (see Fig. 4), which reflects an idea about the lower boundary of the heaven and obviously stems from the image of the heaven depicted as a storm cloud (Esin, 1999b: 143 – 144).

Thus, the semantics of individual elements suggest that "solar symbols" can be regarded as horizontal models of the world: the classical type of this model is based on the symbol of the heaven that represents the space bounded by the skyline, and the four rays may correspond to the four cardinal points and signify the Four World Mountains or the Four Serpents. It is more correct to name these "solar" symbols as "cosmic" symbols

A square that is a main component of the symbols of the third type probably signifies the earth. An anthropomorphic image in the lower part of one of the figurines, which corresponds to the earth, is square in shape (Vadetskaya, 1980: plate XLVIII, *98*). The majority of square symbols are situated in the lower parts of figurines. Stone enclosures of Okunevo barrows are also square in form, and this symbolizes the boundaries of the Earth World. A slant cross connected with the lower part of the world can also be regarded as a symbol of the earth (see Fig. 5; (Savinov, 1997: plate I)). In some cases, the square is formed by four arcs (see Fig. 1, *14, 15*). Most probably the arcs in this context represent the sky and water and, therefore, in the structure of a cosmic symbol, they may either correspond to the four cardinal points or depict the surrounding ocean.

Some cosmic symbols have horn-like signs on the slopes of the cusps. Previously, it was believed that these horns were due to a semantic affinity between the images of the sun and a bull (Khlobystina, 1971b· 75 – 76). However, the cusp-and-horn pattern in the Okunevo art seems to be related to the serpent's image because it is usually placed on the sides of a serpent's body (see Fig. 3, *4*). Besides, serpents are sometimes depicted with horns (see Fig. 2; 3, *4*). Therefore, the cusp-and-horn pattern is a representation of a serpent-mountain idea in the context of cosmic symbolism. Wavy lines coming from the center of some symbols are obviously related to the symbol of a serpent, although they can also be interpreted as the Four Rivers (see Fig. 1, *8*).

The center of cosmic symbols is one of the most important elements. In different mythological systems, the center of the world was endowed with a maximum sacral power and was treated both as a source of the World Order and a place of creation (Rabinovich, 1994: 428). The Okunevo population apparently shared this idea as their stone figurines had a central symbol of the World Egg. The fact that rays of cosmic symbols radiate from their centers shows that these images follow the rule of reverse perspective; i.e , they come from the center, which could be denoted by a cosmic symbol of smaller size serving as a "base" of the entire design and symbolizing the microcosm (see Fig. 1, *3, 13*).

Not only the spatial, but also the time content can be identified in the structure of cosmic symbols, because in prehistoric mentality, space and time were closely associated (Toporov, 1983: 232 – 233). The four rays denoting the four cardinal points might simultaneously model a time structure of the world: the four parts of a day, month, and year. In some cases, there are horns on the rays; i.e., each of the four elements consists of three parts and the sum of all their elements is twelve. Hence, in the time context, the Okunevo cosmic symbols correspond to the annual cycle. As the time content is depicted within the circular scheme, the circle of cosmic symbols, in addition to its spatial significance, used to mean the time cycle, and its center denoted not only the place but also the time of the world's creation.

In some cosmic symbols, one can distinguish ten, nine, eight, and six numbers, unlike the classic scheme of having four rays. Undoubtedly, these numbers (as well as the number four) had a certain cosmological meaning, but they served to represent different ideas. In particular, six rays refer to the calendar tradition that distinguishes six cardinal points (for example, that of the ancient Iranians): the north, the south, and the points of sunrise and sunset on the days of summer and winter solstices (Golan, 1994: 150). Obviously, eight rays symbolize the structure of space as the four main and four intermediate cardinal points (Fig. 8). Eight may correspond both to the number of lunar phases in a lunar month and to the eight-year cycle, which was used in ancient times to adjust the time counting by the sun and moon. It is probable that nine and ten numbers also had certain calendar meaning (Leontiev, 2000a: 146 – 149). However, along with their calendar content, rays retain their significance as pillars, and their large number is comparable to a mountain range running along the edge of the world

The reconstructed semantic content of the symbols includes the space-time parameters of the universe and can be interpreted as a symbol of the universe cosmic law, which defines the principle characteristics of the world and their interrelations.

Such understanding of the semantics of the Okunevo cosmic symbols parallels ancient written records and might be compared to the cosmic laws of *ṛta-* in Rig-Veda, *aša-* in Avesta, etc. Obviously, in ancient times, these beliefs were widely spread among the population of the Eurasian steppes, and therefore the interpretation proposed seems to be valid, particularly allowing for the fact that the rise of the Okunevo Culture is associated with the migration of a new population into South Siberia. However, the meaning of *ṛta* and *aša* in their original context is significantly broader than just the space–time conditions of the world. For example, *ṛta* signifies the universe cosmic law that determines the transformation of the Chaos into the ordered Cosmos, which provides for the rotation of the universe and the preservation of the main conditions for the existence of the world, man, and moral values (Toporov, 1994: 384; Elizarenkova, 1989: 513). The broad context of *ṛta* is comparable to the diversity of the Okunevo cosmic symbols. Evidently, similarly to *ṛta*, the Okunevo symbols used to mean the universe law determining the World Order, and the differences in the ways of depicting were due to different interpretations and explanations of this law.

A very important characteristic of the Veda universe law is that this law determines itself: "the law conceals the law" (Toporov, 1981: 143). This typologically parallels the situation when a cosmic symbol contains another one in its center.

The elements of anthropomorphic faces seen in the Okunevo symbols may be due to personification and idolization of the underlying law. This can be compared to idolization of *ṛta* and an Iranian deity *Arta* (Toporov, 1979: 155). Analysis of a position of cosmic symbols on the stone figurines can lead to a better understanding of the semantics of the Okunevo symbols. Typically the cosmic symbols are situated in the lower tier of the front surface, which suggests the place of a cosmic symbol in the lower world. Similarly, cosmic symbols are seen in the lower parts of stone slabs and in the bottom areas of vessels. A connection between a symbol and a serpent can be interpreted in two ways: according to the "solar" hypothesis, it was thought that the serpent tended to swallow the sun (Khlobystina, 1978: 161, etc.) or, more rarely, that the serpent protects or patronizes the sun (Leontiev, 1997: 225). New understanding of the semantics of these symbols interprets the serpent either as a guardian and creator of the World Order or as a threat to it. Location of cosmic symbols in the lower world and their close connection with the serpent's images make the Okunevo symbols related more closely to the Vedic cosmic law, which is established and guarded by a non-anthropomorphic Varuna, a deity of the lower world and cosmic waters (Keiper, 1986: 32 – 33). At the end of each year, Varuna becomes dangerous and threatens the preservation of the existing World Order (Elizarenkova, 1986: 18).

In the lower tiers of the stone figurines, as well as on the side and rear surfaces, one can see several symbols (three and more) Some of these variants can be explained by more recent addition of these symbols during repeated ritual uses, thereby indicating the performance of a new ritual action, which denoted the beginning of the next time cycle (probably annual). In this case, the combination of two symbols, particularly different symbols, reflects a supposedly two-year cycle of the Okunevo lunisolar calendar, which consisted of two unequal years (Leontiev, 2000a: 144). Double lines contouring some symbols may be connected to this two-year cycle as well (see Fig. 1, *12*). A stable composition of three symbols is most typical of the side surfaces of the figurines. It symbolizes a vertical structure of the World and its correspondence to the Universe law.

The position of a cosmic symbol on the top of a figurine ties a vertical axis of the stone and the radial scheme of the symbol into a united system. This position is explained by the ability of the lower world to reach the heaven and become a night sky. A similar model of the world is recorded in Rigveda and Avesta (Keiper, 1986: 156 – 162, Elizarenkova, 1986: 13 – 14). A probable connection of the upper part of figurines with the lower world is confirmed by the fact that the serpent's mouth, which is an indicator of the lower world, is sometimes seen on the top of the figurines (Leontiev, 2000b: fig. 1, *8*)

A cosmic symbol on the top of a figurine can be compared to the symbol on the forehead of the anthropomorphic face found near Lake Shira, which is at the same time related to the serpent's mouth above this face (see Fig. 5).

Cosmic symbols could be depicted on the rear surfaces of the figurines, because this surface is connected with the lower world: as in the lower part of the front surface, the rear surface could remain undecorated or a serpent could be depicted on it. Images and orientation of the front and rear surfaces were opposite to each other: a front surface with images of the World Egg faced east, to the sunrise, while the rear surface faced west, to the direction of sunset, which coincided with the orientation of the deceased in the Okunevo graves. A flattened rear side of a lying miniature figurine (see Fig. 2) decorated with cosmic images faced the Earth.

Therefore, with allowance for the importance of the center in the Okunevo art, the tradition of depicting cosmic images in the center of anthropomorphic images could be interpreted as a fact of obedience of the Okunevo deities to the universe law represented by the cosmic symbols.

Conclusions

The analysis showed that the Okunevo circular or square images represented a space-time world model. Obviously, these symbols had a broader meaning and also indicated a certain law that determined the conditions of space existence, which was comparable to the Veda law *ṛta*. The Okunevo cosmic symbols were placed in the lower world, in the underground, where they were guarded by a very important deity in the Okunevo pantheon personified as a serpent. Although the serpent was a guard, it could also threaten this cosmic symbol, thereby threatening the Cosmic Order. Obviously, the construction of the Okunevo stone figurines was connected with a threat to the world. Taking into account large sizes and cosmogonic and cosmologic contents, the stone figurines should be associated with the main yearly ritual of the Okunevo Culture. In these yearly rituals, the presentation of the myths of the world origin was of primary importance, because from the viewpoint of time comprehension in cyclic terms, the moment of construction of the figurines was identical to the "onset" of the world. At that time, the Cosmic Order was under a threat, and construction of the figurine modeling the principal cosmic parameters was, apparently, aimed at its affirmation A new figurine symbolized both the beginning of a regular time cycle and a new world recreated by a sacrifice before its construction (Esin, 1999a: 146 – 147). If an already existing figurine was used in this ritual, new cosmic symbols and sacrificial animals could have been depicted on it (Leontiev, 2000a: 145 – 146). The data on the spatial orientation of figurines and the age of sacrificed animals found around them suggest that the main Okunevo ritual was held on the day of the summer solstice.

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THE TALAKAN CULTURE OF THE EARLY IRON AGE IN THE WESTERN AMUR REGION

(based on the materials from the Ust-Talakan site on the Bureya River)*

Introduction

The Amur River is traditionally subdivided into upper, middle and lower zones. However, data on the ethnocultural history of the Early Iron Age and initial periods of the Middle Ages indicate two major ethnogeographic regions – the Western and Eastern Amur (hereafter Priamurye) regions. The natural border between them is the Lesser Khingan Range.

Presently in the archaeological record of the western portion of the middle Amur, there is a great chronological gap between the final stage of the Uril Culture (5th century BC) and the beginning of the Middle Ages. This gap corresponds with the chronological period of the Poltse Culture in the neighboring eastern region. Many researchers admit the fact that in Eastern Priamurye during the Kukelevo stage (AD 4th century) the Poltse Culture was replaced by the Mohe Culture, represented by the sites of the Blagoslovennoe-Naifeld group. In Western Priamurye, Poltse Culture sites have not been recorded as yet; only sporadic objects are encountered there. In this region the earliest medieval monuments are settlements and sites of the Mikhailovka Culture, ethnically attributed to the northern group of the Shiwei tribes (Bei, Bo, Shenmoda) and dated to the AD 3rd – 10th centuries.

The possibility of filling in the chronological gap emerged with the discovery of the Talakan Culture. This culture was named after the site of Ust-Talakan on the Bureya River where complete vessels of the Talkan type were found for the first time. The culture was identified by a specific complex of ceramic wares spread across Western Priamurye, as well as by a series of absolute dates bracketing the period synchronous to the Poltse Culture in the Eastern Priamurye. At the present time there are nineteen occurrences of this sort of ceramics known in the territory stretching from the mouth of the Shilka River (a sacrificial place near the Sredne-Shaikino petroglyphs (Mazin, 1986: 170)) in the northwest to the Jiucheng locality on the right (Chinese) bank of the Amur, 11 km downstream from mouth of the Bureya (Zhang Wei, Fan Zhonze, Sun Shiming, 1997: 35) in the southeast (Fig. 1).

Typology of the Talakan dwellings

The following description of the Talakan Culture is based on the materials of Ust-Talakan, the only site of this culture that has been completely excavated at this time (dwellings 1, 4 – 7 and a storage pit 4). Because this was a seasonal site, artifacts were scarce. The studied dwellings of the Talakan group were subdivided into two types.

Type 1. Dwellings with a foundation pit (1, 4, 6). Rectangular foundation pits were dug to a depth of 50 – 100 cm. None of the structures of this type had a frame-base. The walls of the foundation pit, supported by vertically set birch bark sheets, horizontal half-beams (dwelling 1) and paling (dwelling 6), served at the same time as walls of the dwelling. Most likely four rafter poles came out of the lower corners of the foundation pit; remains

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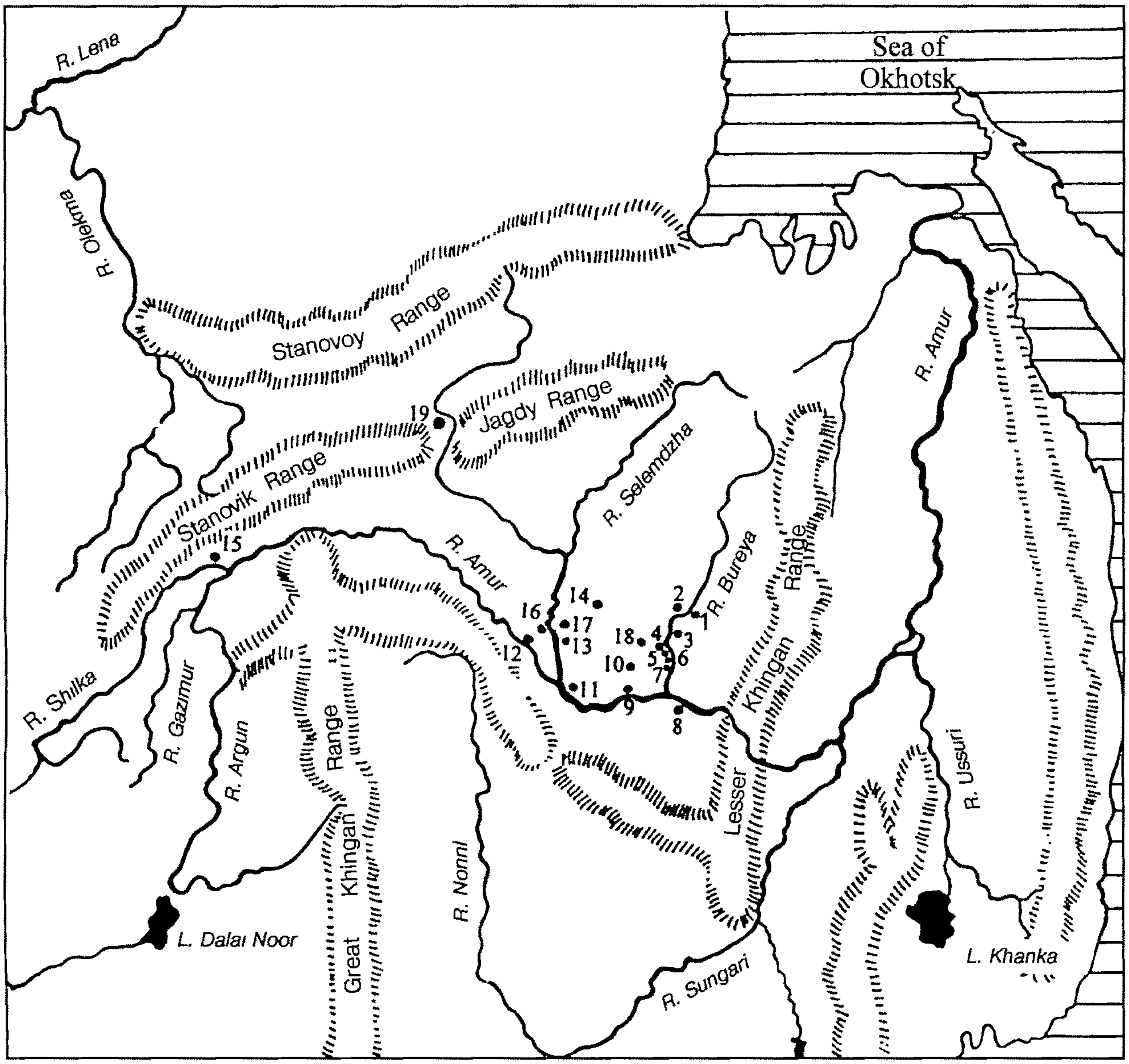


Fig 1 Map showing the distribution of occurrences of the Talakan type ceramics in the Amur River basin
1 – Ust-Talakan, *2* – Talakan village, *3* – Sukhiye Protoki-2, *4* – Bukinsky Kluch-1, *5* – Bezumka, *6* – Bolshiye Simichi, *7* – Malye Simichi, *8* – Jiucheng (People's Republic of China), *9* – Shapka town, *10* – Mikhailovka settlement, *11* – Grodekovskoye settlement, *12* – Alekseevsky Bugor, *13* – Semiozerka, *14* – Tomskoye, *15* – Sredne-Shaikino, *16* – Priadchino, *17* – Velikokniazevka, *18* – Boldyrevka, *19* – Zeya town

of the rafters were found in all dwellings. In dwelling 6, they were set at an angle of 52° inside the living space. To cover the slopes of the roof long half-beams were used, abutting at the upper edge of the pit. Their upper ends could have been supported by a crossbar fixed between two rafters (or the upper frame-girt). A similar constructional element was found in dwelling 6. The wooden roof was covered with birch bark pieces and then with turf. Another method of covering the roof involved the usage of just birch bark or animal skin (dwelling 1). Based on these constructional features, an inference about the typological diversity of the dwellings can be drawn.

Subtype 1.1. This subtype is represented by dwelling 1; its diagnostic feature is a sub-square shape (6.0 x 6.8 m). A hearth was situated in the middle of the interior. The cup-shaped bottom of the hearth was paved with birch bark and powdered with sand. The walls of the foundation pit were separated from the living area by birch bark sheets. A light material was used to cover the slopes of the roof (Fig 2, *1*).

Subtype 1.2. Dwelling 4 refers to this subtype (Fig. 2, *3*). It is rectangular in shape. The roof was covered by half-beams set at an angle and covered with birch bark overlaid by earth (turf). A round hearth was

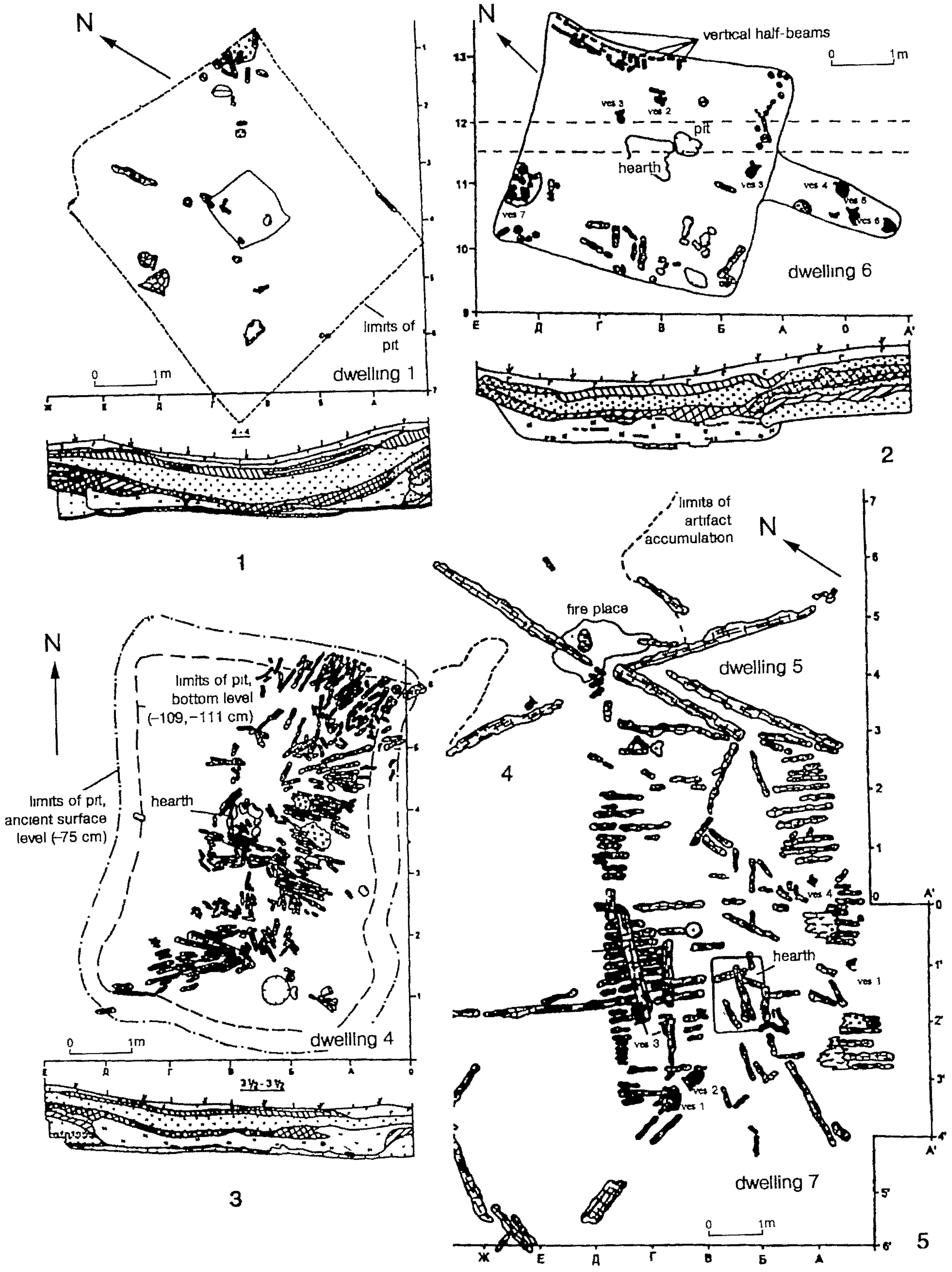


Fig 2 Types of the Talakan Culture dwellings.
1 – 3 – with a foundation pit, *4, 5* – without a foundation pit. Ves - vessel

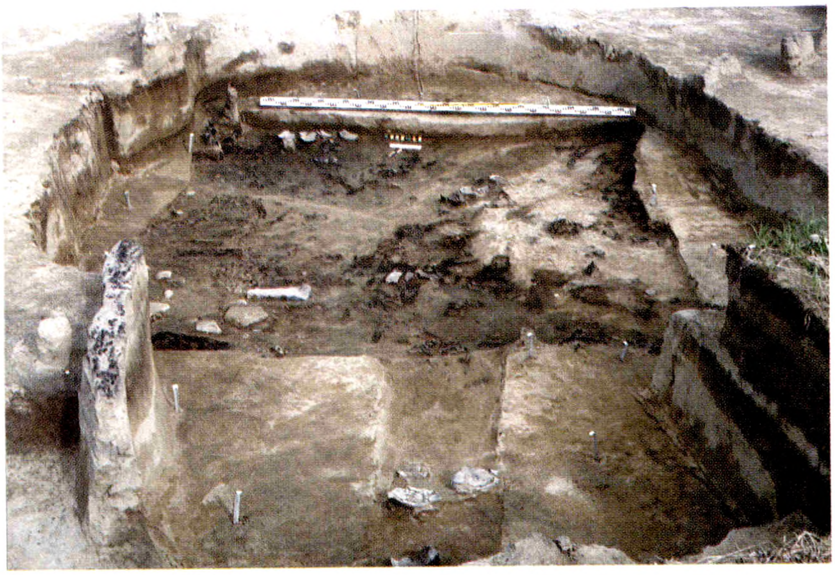


Fig. 3. Dwelling 6 at the floor level.

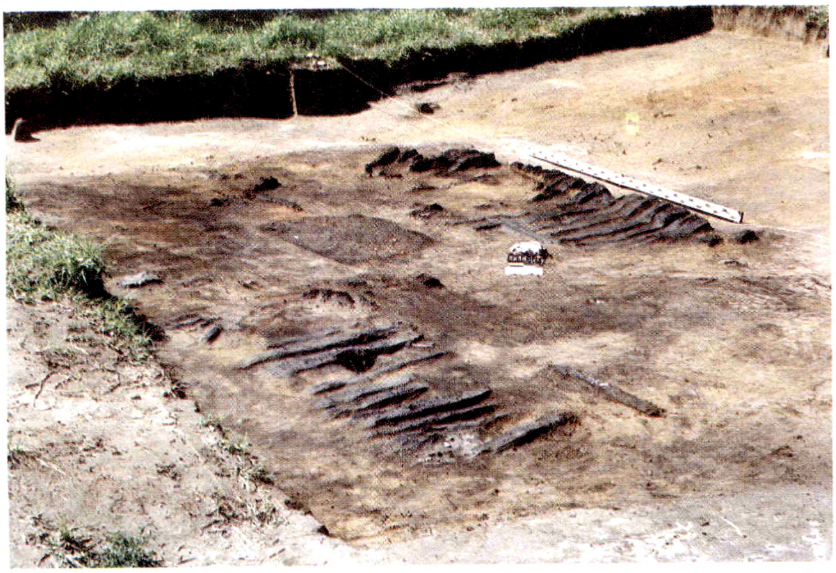


Fig. 4. Dwelling 7 at the floor level.

paved with river pebbles along the perimeter (Djall et al., 1996: 31).

Subtype 1.3. Dwelling 6, with a nearly square shape, refers to this subtype (Fig. 2, *2*; 3). It has a very deep foundation pit (up to 1m deep). The walls of the foundation pit were coated with vertical half-beams and small logs. The particular feature of this dwelling is a long (2.25 m) and narrow (47 – 80 cm) entrance-corridor, which is separated from the living area by a step 12 cm high. This corridor gradually ascends towards the exit to the surface. The difference in elevation between the lower and upper ends of the corridor is 19 cm; traces of steps of a pre-entrance pit were found (Bogdanov, Alkin, Nesterov, 1996: 23 – 24).

Type 2. Above-ground dwellings are represented by dwellings 5 and 7, constructed directly on the ancient surface. Each one of them represents a separate subtype (Nesterov, Bogdanov, Alkin, 2000: 170 – 173).

Subtype 2.1. The structure of dwelling 5 consists of four rafters with their lower ends abutted on the ground and the upper ones assembled in a knot. The rafters outlined a rectangular area with dimensions of approximately 5 × 6 m. The roof had a portable covering. There was a fireplace of an indefinite shape (Fig. 2, *4*)

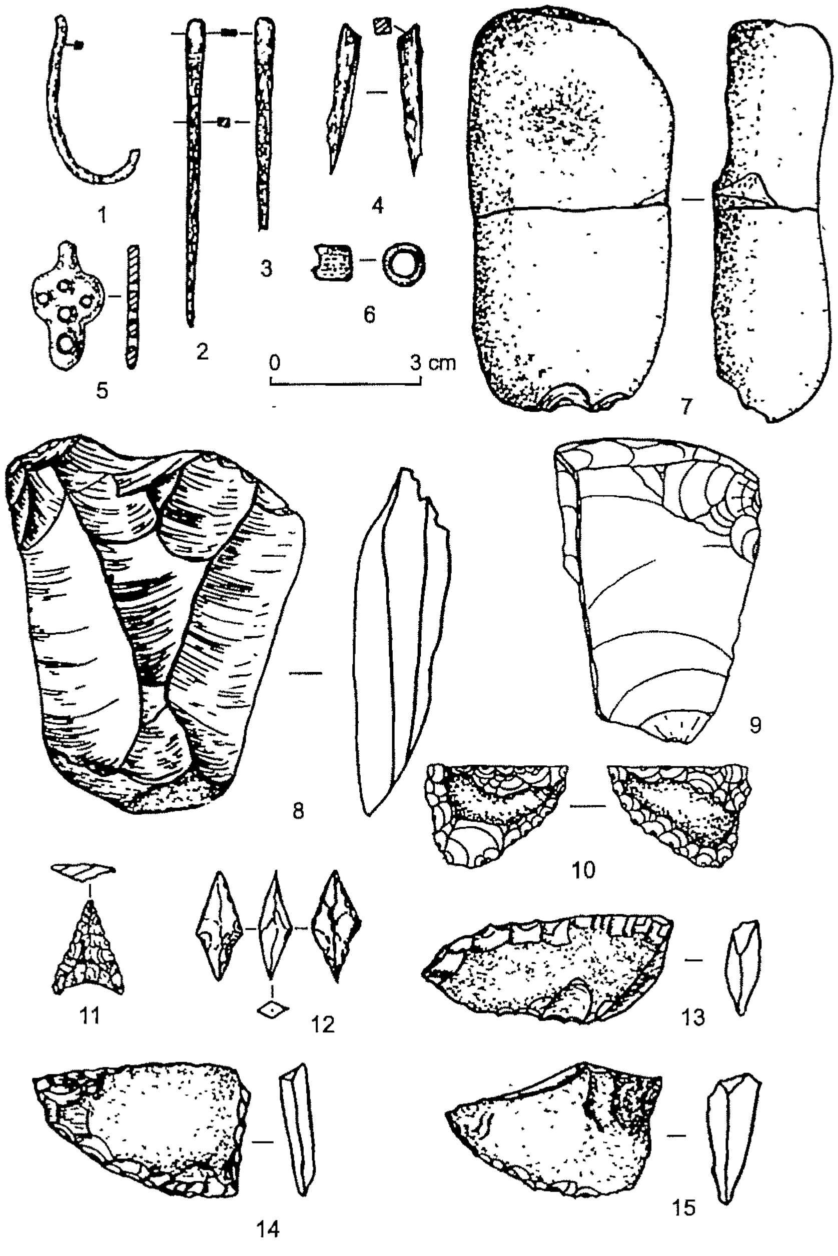


Fig 5 Artifacts of the Talakan Culture
1 – iron hook, *2, 3* – iron bars, *4* – iron point; *5* – bronze adornment, *6* – chalcedony bead, *7* – stone anvil; *8, 9* – stone scrapers, *11, 12* – stone arrowheads, *10, 13 – 15* – stone knives

located under the crossing of the rafters in the center of the dwelling.

Subtype 2.2. is represented by dwelling 7, rectangular in plan (Fig. 4). It is characterized by shelf-boards constructed along the length of the dwelling. They are made of thin logs, laid across the longitudinal floor-supports. The hearth, rectangular in shape, is shifted from the center to the shorter side of the dwelling It is paved with thin boards along the perimeter (Fig. 2, *5*).

Dwellings 1, 4, and 6 are similar in terms of their interior setting. In these dwellings ceramic vessels were situated along the walls or near the hearths. In dwelling 7, the clayware was placed on a shelf-board, closer to the solid wall. In all the dwellings, big stones were situated near the hearths. Accumulations of artifacts were found on the floor around the stones. The stones by the hearths were probably used as seats.

Although some of the Talakan dwellings had a sub-square shape, rectangular structures dominated.

A construction within storage pit 4 was also of rectangular shape. Inside the deep hole, which was dug out with a ledge-step leading from the level of the ancient surface, inhabitants of the site built a wooden frame. Logs of the frame were laid and fixed by stakes on an edge of a narrower pit. Through the center of the longer side a beam (a ridge) was laid, which served as a support for the pit's cover. Since flat boards were absent, it is possible that the cover was made of some light material – most likely birch bark,

Table 1 Percentage of stone tools from dwellings of the Talakan group

Dwelling number	Scrapers	Polishers	Anvils	Retouchers	Butchering knives	Hammerstones	Grinding stones
1	44.4	33.3	11.1	11.1	–	–	–
4	70.8	12.5	4.2	–	4.2	4.2	8.3
5	10.5	68.4	5.3	10.5	–	5.3	–
6	64.7	17.7	17.7	–	–	–	–
7	23.8	23.8	14.3	4.8	19.1	14.3	–

Table 2. Parameters of the Talakan type vessels, cm

Number of			D_r	D_b	D_n	D_{mb}	H	H_n	H_{lp}	T_w
dwelling	vessel	thin section								
1	1	39	18 – 18.5	4.5 – 5	15.3	18.5 –19	27.5	2	14	0.5
1	2	15	23.6 – 24.2	6.2 – 6.3	20	24.6 – 25.2	35	4	16	0.5
5	–	17	18 – 18.8	6.5 – 7.5	14 – 14.4	16	20	3	10.5	0.5
6	1	21	25.3	–	19.3	24.8	–	3.6	14	0.5
6	2	12	13.9 – 14.1	5.5 – 5.9	10.5 – 11	12	14.9	2.5	6.8	0.4
6	3	13	17 – 17.6	6.3 – 6.6	14.6	16.4 – 16.9	23.2 – 23.5	3.6	11	0.4 – 0.5
6	4	22	–	6.6	–	19.4	–	–	14	0.4 – 0.5
6	5	23	–	–	15	18	–	–	–	–
6	6	–	13.8 – 14.2	3.9 – 4.2	11.2 – 11.6	15.3 – 15.5	22.8	3.5	11	0.4 – 0.5
6	7	26	–	–	11.6	35.1	–	–	–	0.9 – 0.11
7	1	27	–	10.6	15.9	39.9 – 40	–	–	–	1.1
7	2	11	20.2 – 20.8	7 – 7.4	16.1 – 16.5	21.3 – 21.8	29.5	3	15	0.3
7	3	19	19.5	–	15.5	22.9	–	2.8	12	0.3 – 0.4
7	–	20	22.1	–	18.1	–	–	2.6	–	0.3 – 0.4
7	–	–	11	–	8	–	–	2.2	–	0.5

Note. D_r – rim diameter, D_b – bottom diameter, D_n – neck diameter, D_{mb} – maximum body diameter, H – vessel height, H_n – neck height, H_{lp} – lower portion height, T_w – wall thickness.

which burned away completely. The depth of the storage pit from the level of the frame down to the bottom is about 1 m (Nesterov et al., 2000: 283, App. 2, fig. 56).

Artifact complex

The artifact complex of the Talakan Culture includes metal and ceramic wares as well as stone tools.

Metal objects are not numerous (Fig. 5, *1 – 5*). They include a fishing hook, a knife tip (dwelling 1), fragments of a wire and a bar (dwelling 4), two iron points (5.7 cm long) in the shape of nails and awl-like arrowheads from dwelling 6, and a bronze pendant (found at the bottom of a hollow formed above dwelling 1). An object similar to the pendant is known from the collection of artifacts found at the Early Iron Age site of Alekseevsky Bugor on the Amur (Bolotin, 1999: 113, fig. 4, *3*).

Use-wear analysis of the stone implements (Table 1) conducted by P.V. Volkov allowed not only the determination of the tools' functions, but also a comparative analysis of the artifacts from each dwelling (Fig. 5, *6 – 15*). Results of the analysis have provided arguments in favor of a seasonal character of the site's occupation (Nesterov et al., 2000: 117 – 119).

Ceramics dating to the Early Iron Age site are represented by nine intact vessels (Table 2; Fig. 6 – 8) as well as by numerous fragments of the upper parts, the bottoms and the walls of the pots.

Selection of raw materials and composition of clay mixtures. The Ust-Talakan potters used hydro-mica of montmorrilonite composition to manufacture the ceramics. Sometimes the clay contained a small portions of admixtures such as siliceous and fine-aleurite detritus which occur as grains of quartz and feldspar, or less frequently as mica scales (Table 3). Since the montmolillonite has a specific "fibrous" structure, the source of this raw material was probably associated with volcanic ash. Such clays are very "greasy" and require a large amount of temper: our petrographic analysis shows that in this case temper constitutes from 15 to 60%.

Two recipes for the preparation of the ceramic paste have been identified through the examination of ceramics at the site:

1) clay + crushed rock fragments (89% of the ceramic wares were manufactured in accordance with this recipe);

2) clay + crushed rock fragments + grog (11%).

Fresh and lightly weathered granites, grains of feldspar and granitoid quartz dominate the rock fragments. Fragments of micro-quartzite, mica, and siliceous rocks are less numerous. The fragments are angular, elongated and irregular in shape (average sizes of the fragments, 0.01 – 2.0 mm; the 3.0 mm ones are rare; the prevailing size ranges from 0.1 to 0.3 – 0.7 mm). The grog is of the same size and is rare in the analyzed ceramic samples. Organics have not been recorded (see Table 3, thin sections N 11, 12, 15, 17, 20 – 24, 26, 27). Since clay reserves have not been found at the site, therefore it is impossible to identify the provenance of the clay. However, considering the homogeneity of the Talakan ceramics and of the medieval ceramics found in the same layer both in coloration and in the composition and structure of the raw material, it seems that the Iron Age and the medieval potters used clay sources of similar quality, most likely local sources.

In Priamurye, the tradition of using rock fragments as temper can be traced back to the Neolithic (Mylnikova, 1999: 21 – 26). This was probably due to technological conditions: sources of stone building materials,

Table 3. Data obtained through petrographic analysis of ceramics from the Ust-Talakan settlement

Number of				Composition of cement	Composition of ceramic paste*	Share of admixtures, %	Grog, %	Size of rock fragments, mm	Composition of rock fragment admixtures
dwelling	vessel	thin section	code						
1	2	3	4	5	6	7	8	9	10
11	7	2	2210	Hydromica of montmorillonite composition	C+RF	25	–	0.01 – 1.5 0.1 – 0.15	Quartz, feldspar (granitoid), biotite
12 (Fig 14, *6*)	6	2	1504	Hydromica of montmorillonite composition + siliceous material (3%)	C+RF	40	–	0.02 – 2.0 0.18 – 0.25	Quartz, feldspar (granitoid), less frequently – fragments of granites, microquartzites, siliceous-mica rocks, seldom – volcanic glass
13	6	3	1572	Hydromica of montmorillonite composition + siliceous material (ca 4%)	C+RF+G	15	A single case	0.05 – 1.25 0.08 – 0.2	Quartz, feldspar (granitoid), fragments of granites, quartzified andesite porphyrites, microquartzites, epidote
15	1	1	584	Hydromica of montmorillonite type associated with ash material	C+RF	50	–	0.01 – 2.0 0.15 – 0.5/0.5 – 0.8	Granites, grains of feldspar and quartz (granitoid)
17 (Fig 14, *8*)	5	–	1197	Hydromica of montmorillonite composition	C+RF	25	–	0.03 – 1.3 0.1 – 0.25	Quartz and feldspar (granitoid), seldom – fragments of granite
19	7	3	2225	Montmorillonite aggregate associated with ash material	C+RF	20	–	0.01 – 1.0 0.1 – 0.25	Quartz and feldspar (granitoid), granites
20	7	–	–	Hydromica of montmorillonite composition on ash base	C+RF	30	–	0.01 – 1.5 0.1 – 0.5	Granites, quartz, feldspar (granitoid)
21	6	1	1772	Hydromica of montmorillonite composition	C+RF	18	–	0.02 – 0.75 0.1 – 0.25	Quartz, feldspar (granitoid)
22 (Fig 14, *7*)	6	4	1501	Hydromica of montmorillonite composition	C+RF	30	–	0.05 – 1.3 0.15 – 0.3	Quartz, feldspar, granites, biotite
23 (Fig 14, *3*)	6	5	1502	Hydromica of montmorillonite composition	C+RF	40	–	0.02 – 1.25 0.08 – 0.4	Quartz, feldspar (granitoid), less frequently – micro- and macroquartzites, granites, siliceous rocks, micas, epidote
24 (Fig 14, *4*)	6	–	–	Hydromica of montmorillonite composition	C+RF	50	–	0.01 – 1.3 0.05 – 0.5	Quartz, feldspar (granitoid), less-frequently – granites, microquartzites, siliceous rock fragments, seldom – pyroxen, micas, lithonitized agnetite, spinel
26	6	7	1704	Hydromica of montmorillonite composition associated with ash material	C+RF+G	60	A single case	0.02 – 1.5 0.08 – 0.7	Quartz ceratophyres, quartz, feldspar, granites, micas, magnetite, amphybol, biotite, volcanic glass
27 (Fig 14, *5*)	7	1	2212	Hydromica of montmorillonite composition	C+RF	45	–	0.025 – 1.3 0.07 – 0.8	Quartz ceratophyrite, feldspar, anataz, pyroxen, biotite
32	1	–	–	Hydromica of montmorillonite type	C+RF	30	–	0.03 – 1.3 0.05 – 0.5	Granites, siliceous mica fragments, pyroxen, turmaline
33 (Fig 14, *2*)	1	frag	582	Hydromica of montmorillonite composition+fine allevrite material (8%)	C+RF	20	–	0.03 – 0.6 0.1 – 0.3	Quartz, feldspar, less frequently – microquartzites, siliceous and mica-siliceous fragments, seldom – biotite, limonitized fragments, epidote
39 (Fig 14, *1*)	1	2	587	Hydromica of montmorillonite composition associated with ash material		28	–	0.02 – 2.0 0.08 – 0.7	Quartz, feldspar (granitoid), less frequently - microquarzites, granites, siliceous rocks, micas; epidote

*C – clay, RF – rock fragments, G – grog.

concentrated primarily in the southern part of the Khabarovsk Territory and the Amur Province, vary in petrographic composition, the degree of tectonic deformation and weathering; they have high technological qualities and are easily accessible (Geologiya SSSR, 1976: 189 – 203). The angular shape of the fragments suggests the crushing of the tempering admixture. Most likely, thoroughly crushed rocks were not sifted before being added to the clay. In order to make the ceramic paste both small and big fragments (though not larger than 3 mm) were used. This improved the quality of the obtained paste, in which the natural non-clay admixtures constituted not more than 3 – 8%.

Shaping of the vessels. Visual observations and optical analysis via a binocular microscope indicate that the vessels were fashioned in two ways: (1) a pot might be pressed out of a clay lump or (2) it might be constructed by coiling.

Very small pieces were pressed out of a single lump of clay. Two such vessels have been found. They were formed on a separately prepared flat base and therefore have a flat bottom. Such vessels are characterized by an elevated bottom, a slightly bulging body with a rounded (in the cross-section) internal surface (see Fig. 6, *10, 11*).

The majority of the vessels were shaped by the method of coiling (Fig. 9, *a*; 10, *a*). Horizontal joint "seams" that connect the coils are seen on the internal (and sometimes on the external) surface of the vessels. The splits along the joint indicate that parts of the vessels were conjoined by an overlap or edge-to-edge joints. Some of the coil edges are beveled. The vessels were normally made of five to nine coils 3.5 – 5cm wide. The thickness of the vessel walls fluctuates from 0.3 to 0.7cm.

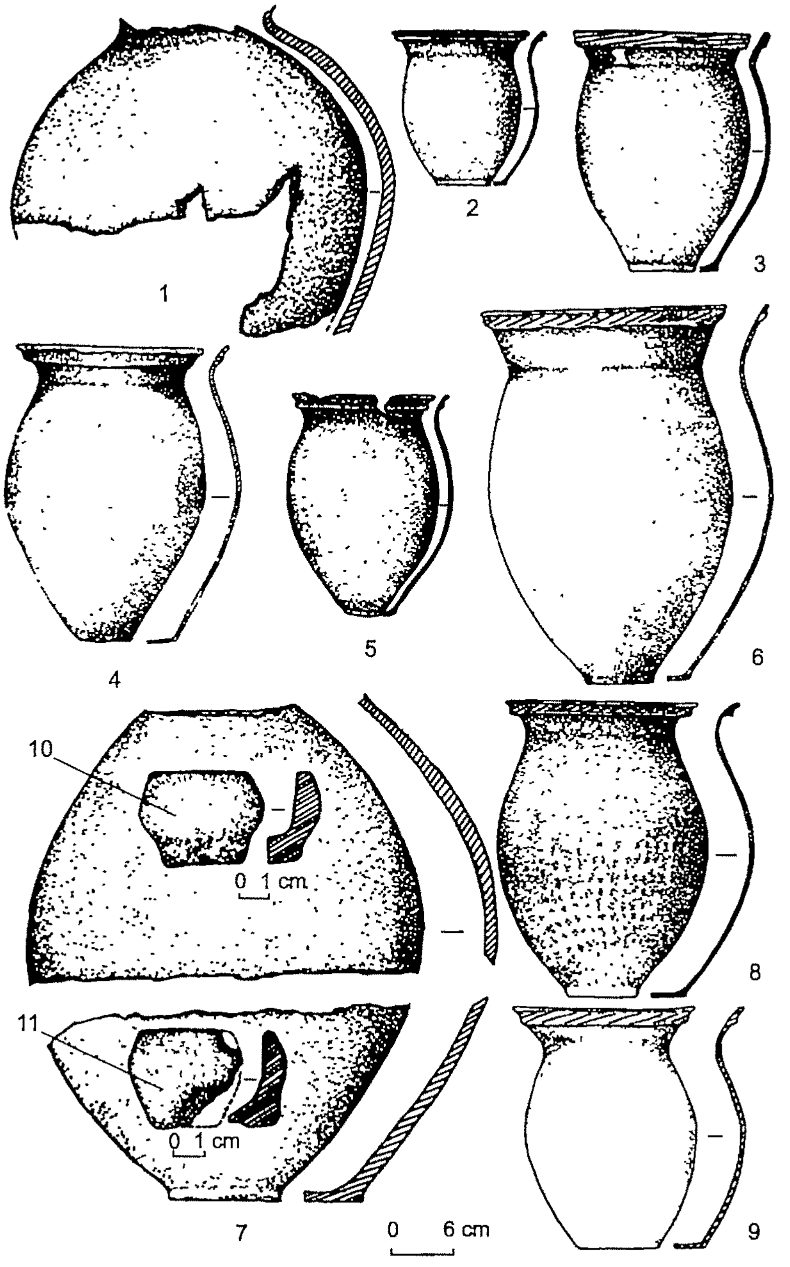


Fig 6 Vessels of the Talakan Culture
1 – 3, 5, 10 – from dwelling 6, *4, 6* – from dwelling 1, *7, 8, 11* – from dwelling 7,
9 – from dwelling 5.

This circular coiling method does not require additional operations to shape the vessel or to make its walls thicker. The proper thickness was preset when the coil was made; the shape was formed by slanting the bands to one or the other side when the coils were attached to each other. The bodies of some of the vessels (30 – 40%) were tamped down via paddle and anvil. Evidence for this technique – in the form of relief indentations – can be seen on the internal surfaces. The tool probably moved horizontally, although, judging by the pattern of the indentations, it could have moved randomly. Pebbles might have served as anvils. The paddles had a flat smooth surface; only in one case its working surface had square indentations rubbed out in the process of the subsequent treatment of the vessel's surface (Fig. 11, *2, 4*). Petrographic analysis shows the effects of such tamping as an indistinct micro-lamellar structure of the clay material.

In the majority of cases (80%) the vessels were assembled from two parts: the upper and the lower (see

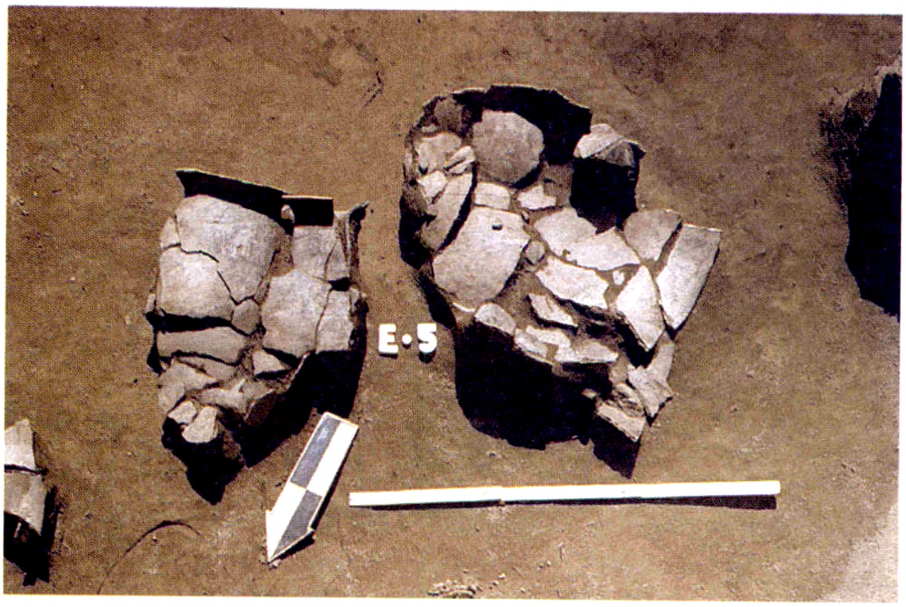


Fig. 7. Vessels from dwelling 1.

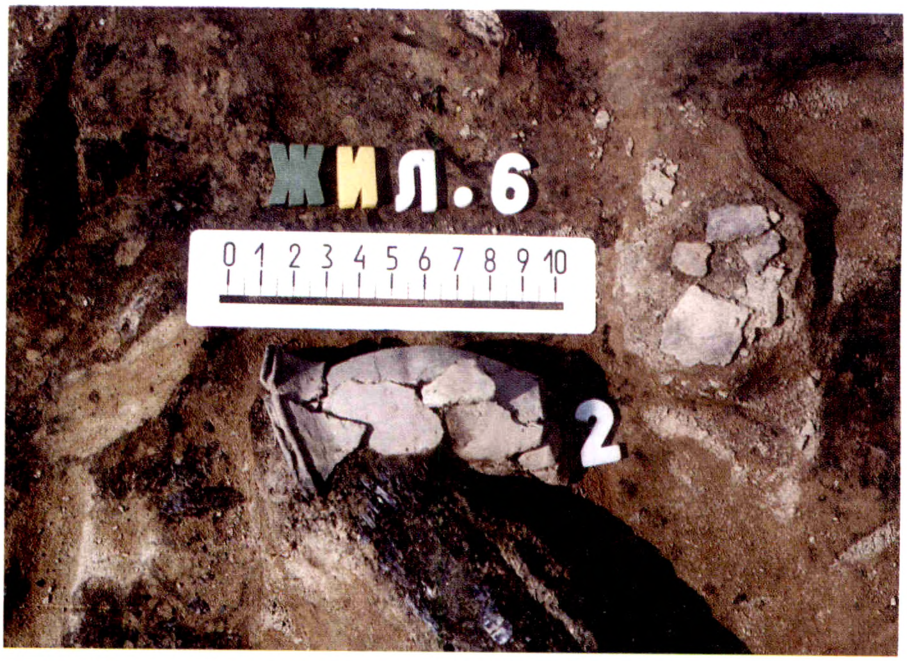
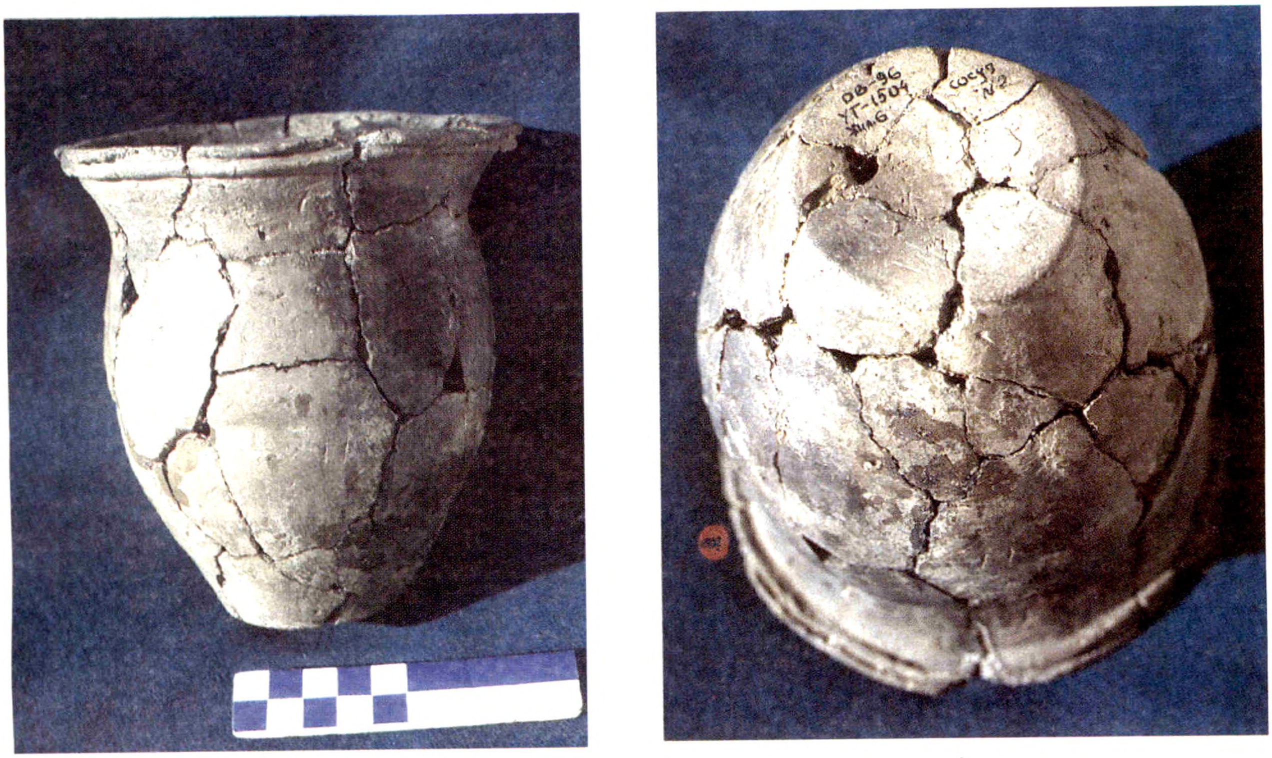


Fig. 8. Vessel N 2 found on the floor of dwelling 6.

Fig. 10, 11). The upper part consisted of a neck and two or three bands of the body; the lower part consisted of the bottom and three or four coils near the bottom part of the body, depending on the vessels' dimensions. The necks are wide (neck-width index is 0.78 – 1.0) with a medium- or well-defined profile (neck profiling index is 0.34 – 0.82). They generally have one complete circular coil 2.5 – 4.5 cm wide and they are attached to the body-forming coil by an overlap or edge-to-edge joints.

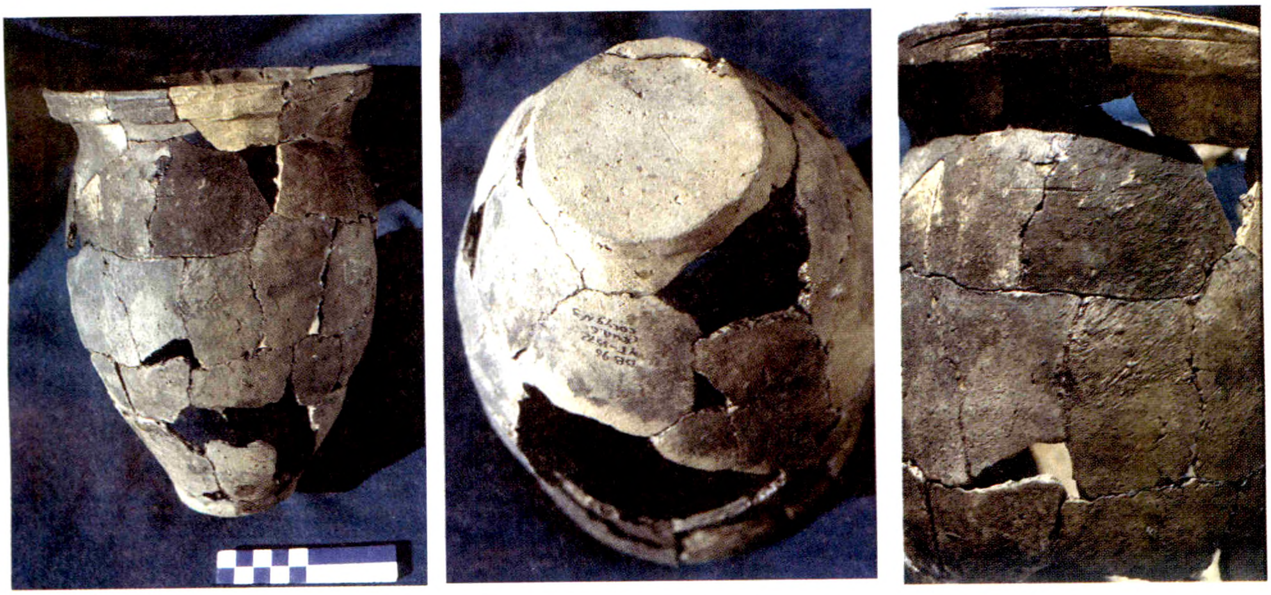
Two-part vessels are normally represented by objects characterized by heights exceeding 50 cm and large values of width indices. All the vessels of the Ust-Talakan site have well-developed structural forms and are of medium height (15 – 35 cm). Since they were made by coiling, it remains unclear just why the two-part technique was used.

In characterizing pottery traditions, we need to consider the specifics of the formation of bottom and neck parts of the vessels (such as the contour and shape of bottom and rim). These features serve as diagnostic tools for cultural



a b

Fig. 9. Examples of the body shaping by coiling (*a*) and bottom shaping on a hard surface (a cup-like base) (*b*). Vessel N 2 from dwelling 6.



a b c

Fig. 10. Examples of the body shaping by coiling (*a*), bottom shaping from a flat circular base and on a hard surface (*b*), and surface treatment by a hard tool and washing with a clay solution (*c*). Vessel N 3 from dwelling 6.

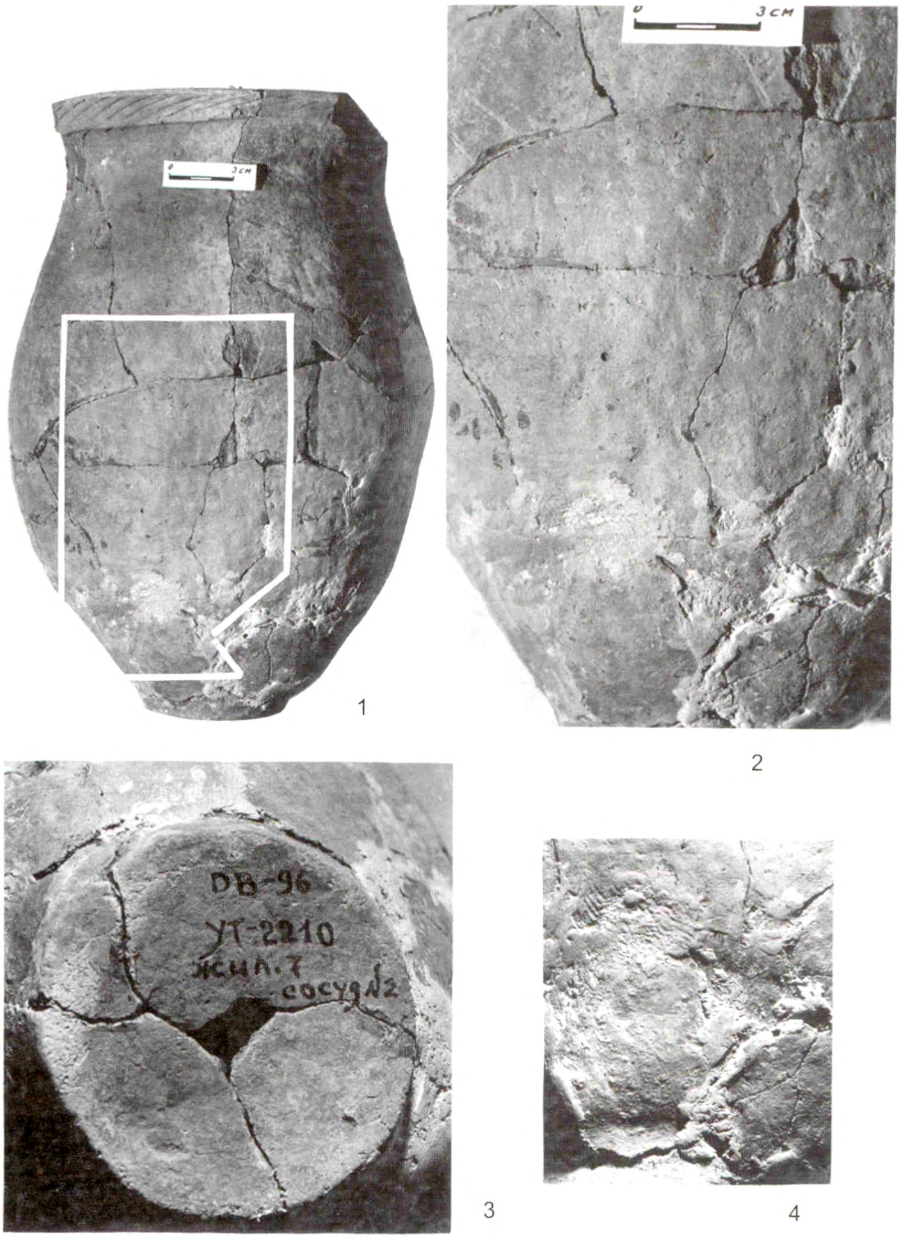


Fig. 11. Vessel N 2 from dwelling 7 (*1*); traces of the surface treatment by tamping (*2, 4*); an example of the bottom formation on the base of a cup made of a coil (*3*).

identification of ceramic complexes (Shepard, 1965: 224 – 248; Neolit yuga Dalnego Vostoka, 1991: 126 – 127).

At Ust-Talakan, all the vessels are flat-bottomed. Their bottoms consist of flat circular bases with the first lower coil attached edge-to-edge (see Fig. 10, *b*) or of cup-like bases (see Fig. 9, *b*; 11). We have identified two methods used to construct the vessels on the cup-like bases: (1) pressing out of a single lump of clay and (2) formation of a circular coil whose opening was stuffed with a piece of clay. Shaping was done on a hard (see Fig. 10, *b*) or a soft (Fig. 12, *c*) surface. The resulting base had either an even form with a sharp angle between the bottom and the body, or was convex in shape with a rounded body seam. Some vessels had bottoms formed on a surface powdered with some dry substance. These are wide-bottomed vessels (bottom-width index is 0.25 – 0.51), egg-shaped in outlines (the angle of the wall ranges between 115 – 135°).

Generally speaking, at the Ust-Talakan site, several traditions were used to shape the bottoms of vessels classified as the Talakan type.

The technique of shaping the rims was simple and uniform for the whole complex. Ninety percent of the objects have a coil (1.5 cm wide) attached to the external surface (2 – 3 cm below the coil's edge). The coil's upper and lower edges were smoothed by the potter's fingers and attached to the neck part of the vessel resulting in coil bands triangular in cross-section. In rare cases the roll was formed from the same coil as the rim. These band-rolls were usually decorated.

Surface treatment included several operations:

1) processing with a hard tool (a wooden paddle or a sliver). All the vessels have on their surfaces parallel or irregularly spaced shallow marks grouped into rows of a certain width (up to 4 – 6 cm) (see Fig. 10, *c*; 12, *b*);

2) smoothing with hands. Prints of papillary lines can be traced on upper parts of the vessels;

3) washing with a clay solution (Fig. 10, *b*). Recorded in the form of the clay pieces and slightly rough surface;

4) burnishing with a hard tool (a pebble?) and polishing with soft material.

One feature typical of Ust-Talakan pottery is its crude surface treatment. This feature is more typical on the exterior surfaces. Vessel walls were probably not

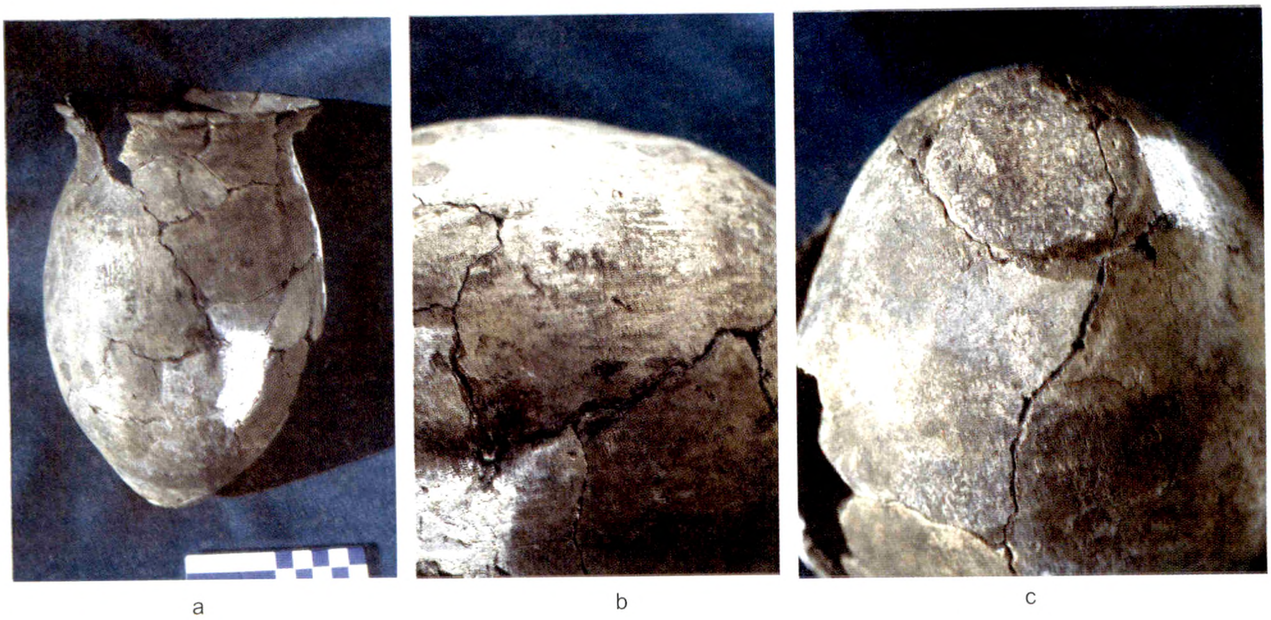


Fig. 12. Examples of the body shaping by coiling *(a)*, surface treatment with a hard tool (*b*), and bottom shaping on a soft surface (*c*). Vessel N 6 from dwelling 6.

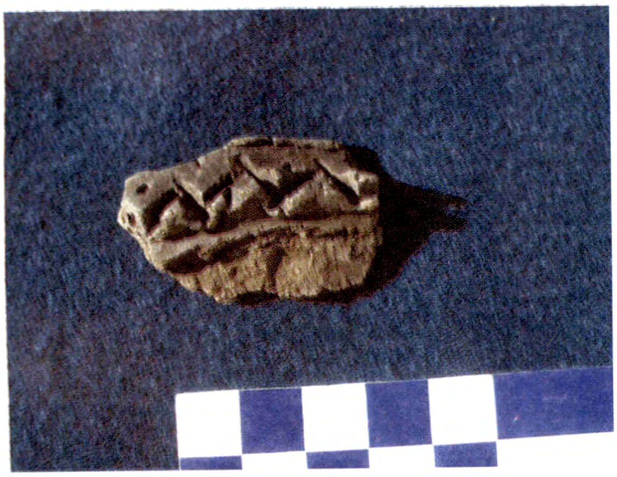


Fig. 13. Fragment of a decoration on a coil-rim. Bukinski Kluch-1 site.

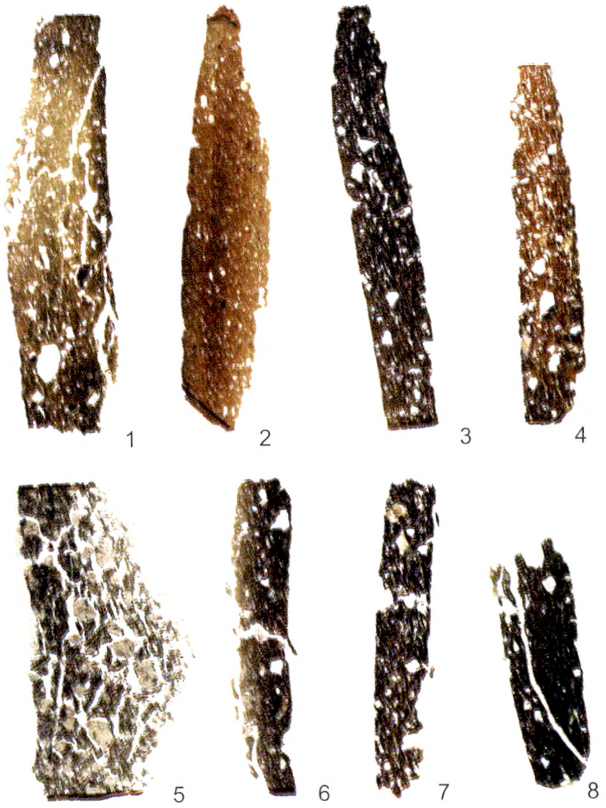


Fig. 14. Thin sections of ceramic vessels. *1* – N 39, *2* – N 33, *3* – N 23, *4* – N 24, *5* – N 27, *6* – N 12, *7* – N 22, *8* – N 17.

smoothed after treatment with a hard tool. Interior surfaces were worked more thoroughly, having been smoothed and burnished to insure greater impermeability. Burnishing has been recorded on 50% of the pots where it was done with a polishing stone which left short, even, slightly glancing oval-shaped stripes on the worked surfaces. The quality of burnishing was rather poor. Some surfaces were also polished with soft leather or even hands (which produced a similar effect).

Two vessels showing a higher quality of surface treatment are especially noteworthy. Vessel N 7 from dwelling 6 (see Fig. 6, *1*) is black in color, with a slipped and well-burnished external surface. The interior surface of this vessel was also covered by a slip. A brown-black vessel N 1 from dwelling 7 (see Fig. 6, *7*) also shows evidence of burnishing the slipped surface with a stone tool.

Firing. Over 50% of the vessels were fired accidentally, resulting in their over-burnt state. The

Table 4. Indices of forms of the Talakan Culture vessels*

Number of			Height index	Neck-height index	Neck-width index	Neck-profiling index	Body-height index	Shoulder-height index	Shoulder-convexity index	Bottom-width index	Ratio of the bottom diameter to the rim diameter
dwelling	vessel	thin section									
1	1	15	1.4 high	0.21 very low neck	0.88 wide neck	0.5 medium profiled	1.2 elongate	0.66 medium high	0.21 slightly convex	0.25 wide bottom	1:4.0
1	2	39	1.47 high	0.13 very low neck	0.89 wide neck	0.67 strongly profiled	1.37 elongate	0.86 medium high	0.17 convex	0.51 wide bottom	1:4.0
5	–	17	1.25 high	0.21 very low neck	1 wide neck	0.66 strongly profiled	1.06 round	0.8 medium high	0.13 barely convex	0.5 wide bottom	1:2.8
6	1	21	–	0.19 very low neck	0.88 wide neck	0.82 strongly profiled	–	–	–	–	
6	2	12	1.15 high	0.23 very low neck	1 wide neck	0.6 strongly profiled	1 round	0.55 medium high	0.22 slightly convex	0.38 wide bottom	1:2.3
6	3	34	1.35 high	0.24 very low neck	0.94 wide neck	0.34 medium profiled	1.25 elongate	0.67 medium high	0.13 barely convex	0.42 wide bottom	1:2.7
6	6	–	1.53 high	0.23 very low neck	1 wide neck	0.6 strongly profiled	1.4 elongate	0.75 medium high	0.22 slightly convex	0.45 wide bottom	1:3.5
7	1	27	–	–	–	–	0.9 round	0.73 medium high	0.75 slightly convex	1.41 narrow bottom	–
7	2	11	1.43 high	0.19 very low neck	0.82 wide neck	0.66 strongly profiled	1.05 round	0.8 medium high	0.08 barely convex	0.47 wide bottom	1:2.8
7	3	19	–	0.18 very low neck	0.78 wide neck	0.71 strongly profiled	–	–	–	–	–

* After (Genning, 1973: 114 – 125)

Table 5. Radiocarbon dates for Talakan type objects at the Ust-Talakan site

Object, material	Year of excavation	Laboratory code	Absolute date, BP	Calibrated date	
				± 1σ	± 2σ
Dwelling 1, charcoal	1993	SOAN-3192	1650 ± 40	AD 342 – 428	AD 256 – 294, 324 – 454, 480 – 530
charcoal		SOAN-3189	1640 ± 25	AD 388 – 426	AD 342 – 436
birch bark		SOAN-3281	1960 ± 60	AD 40 – 88 AD 100 – 110	110 BC – 142 AD, AD 166 – 190, 192 – 200
Dwelling 4, charcoal	1994	SOAN-3282	1810 ± 35	AD 140 – 172, 178 – 236	AD 122 – 256, 294 – 322
		SOAN-3283	1715 ± 35	AD 254 – 296, 322 – 350, AD 356 – 380	AD 244 – 400
Storage pit 4, charcoal	1994	SOAN-3285	1905 ± 35	AD 62 – 128 AD	AD 14 – 144, 164 – 206
Dwelling 5, charcoal	1995	SOAN-3539	2360 ± 110	760 – 680, 660 – 630, 600 – 570, 560 – 370, 280 – 270 BC	790 – 340, 330 – 200 BC
		GIN-8616	1880 ± 40	AD 72 – 142, 166 – 190, 196 – 200	AD 28 – 40, 54 – 228
Dwelling 6, charcoal	1996	SOAN-3638	2100 ± 25	168 – 132, 128 – 106 BC	194 – 88, 64 – 58 BC
charcoal		SOAN-3639	2345 ± 30	460 – 456, 410 – 388 BC	512 – 430, 414 – 384 BC
charcoal		SOAN-3745	2780 ± 30	990 – 954, 940 – 906 BC	1002 – 894, 880 – 846 BC
Dwelling 7, charcoal	1995	SOAN-3540	2350 ± 30	466 – 448, 410 – 390 BC	514 – 428,416 – 388 BC
charcoal	1996	SOAN-3640	2170 ± 40	AD 356 – 290, 250 – 182	370 – 272, 268 – 156, 146 – 116 BC
charcoal		SOAN-3746	2580 ± 30	806 – 784 BC	816 – 764, 676 – 666, 620 – 608 BC
A fragment of a Poltse vessel with carbonized food remains	1994	AA-17214	1962 ± 52	36 BC – 82 AD	AD 100 BC – 128 AD

remainder of the vessels were intentionally fired, which is clearly reflected in the following features: spots on the surface, color variations observed on the breaks, as well as dark-gray or black cores and light outer and inner surfaces of the breaks. Although they used the simplest devices, these ancient potters controlled the firing process very well They knew the principle of firing in oxidation which resulted in the production of terracotta hued vessels (the majority of pieces not burned accidentally), smudging operation (black color of some vessels), and they could foresee the color of the exterior and interior surfaces depending on the position of the vessels in the fire (bottom down or upside down).

Forms of the vessels. All the ceramics found at the site represent the class of necked vessels, the subclass of flat-bottomed, and the group of open forms. The latter contain the following three morphological types as well as several subtypes:

Type 1. High pots with rounded bodies. The body-height index of specimens representing this type equals 0.9 – 1.06; these are vessels from dwelling 5 (Fig. 6, *9*), vessel N 2 from dwelling 6 (see Fig. 6, *2*) as well as vessels N 1 and 2 from dwelling 7 (see Fig. 6, *7, 8*) (Table 4). The following subtypes can be delimited by the neck-height index: subtype 1 – with a medium high (see Fig. 6, *2, 8*) and subtype 2 – with a high (see Fig. 6, *9*) neck.

Type 2. High pots with extended bodies (the body-height index equals 1.2 – 1.4) can also be divided into two subtypes: with a low (see Fig. 6, *6*) or a medium high (see Fig. 6, *3, 4*) neck.

These types of vessels are highly homogeneous. They have straight rims with round configurations, which in some cases projects outward. The point of maximum diameter is located in the middle of the body. There is a coil beneath the rim. In shaping these vessels, the potters maintained the following proportions: an increase in the height (H) of the vessel resulted in an increase of the maximum body diameter (D_{mb}). This proportion ($H:D_{mb}$) is retained and equals 1.15 – 1.53. The ratio of the rim diameter (D_r) to the maximum body diameter ($D_r:D_{mb}$) is 0.93 – 1.16. At the same time, the proportion between the bottom diameter and that of rim ($D_b:D_r$) was not retained; it changed from 1:4 to 1.0:2.3, while the ratio of the vessel's height and the diameter of the bottom ($H:D_b$) changed from 1.0:2.5 to 1.0.5.8.

Type 3. Vessels with outsized spherical bodies. This type is represented by two vessels, whose shapes cannot be reconstructed (see Fig 6, *1*). Undoubtedly, such vessels were originally taller (the maximum body diameter exceeded the neck diameter by 2.5 times and the rim diameter by 3.6 times). Vessels of this particular type are distinguished from others by refined surface treatment.

Traces of carbonized food remains and soot have been found on 85% of the Ust-Talakan ceramics. They occur on both the interior and exterior surfaces of the upper third part of the vessel (see Fig. 10) indicating that these objects were used for cooking. Liquid foods (porridge, soup) were probably cooked in these vessels. Some pieces show signs of repair while other bear signs of secondary use of the vessels (e g., two sherds of vessel N 1 from dwelling 7; see Fig. 6, *7*).

Decorations are present only on coil-rims. The rims include: (a) simple, non-decorated ones (23%); (b) those dissected by unidirectional oblique lines slanted to the right (50%); (c) those dissected by oblique variously slanted lines (23%); or (d) dissected by round holes (the rarest variant, occurring in 4% of the pieces). One rimsherd has its thick lower edge deeply impressed with the flat end of a paddle (2 × 12 mm); the impressions are at 90° angles and form a cogged pattern where punctuations (diameter 2 mm) made by a thin stick are placed between two neighboring tips (Fig. 13).

To date we have identified only three decoration techniques on Talakan ceramics: appliqué, incision, and stamping. Combinations of these techniques are observed on 77% of the decorative compositions, with appliqué prevailing

In summary, the techniques used to make and fire the Ust-Talakan ceramics show continuity from antecedent cultures. These include methods of preparing the raw materials (crushing) and the composition of the clay paste (clay + crushed rock fragments). They are also seen in the smoothing, burnishing (polishing) and covering with slips – all techniques that can be traced back to the Neolithic and the Early Iron Age. The coil appliqué method was the main one used to make the ceramics in the Russian Far East through various periods. The variations in the percentages of additives included in the clay paste can be explained by the nature of the raw material used. This attests to the cumulative expertise of the local potters.

Different pottery making traditions were combined at the site. This can be seen in such features as the use of various techniques to fashion the pot bottoms. They are also reflected in the absence of very tall forms in context of a very elaborated technology of vessel construction (of two parts). The Talakan vessels feature wall profile angles of 115 – 135°, egg-shaped bodies, and rims formed by coils as well as by scarce decoration.

Chronology of the Talakan dwellings

For artifacts of the Talakan type, a whole series of radiocarbon dates have been obtained (Table 5). These dates are within the period between the 10th – beginning of the 4th centuries BC and the 4th – 5th centuries AD. Most radiocarbon dates provide several chronological spans. Thus the radiocarbon method does not permit the definite evaluation of the internal chronology of the dwellings, although it does allow their attribution to the Early Iron Age (mainly to its second period), which in the Eastern Priamurye is represented by the Poltse Culture.

Two variants of dates were obtained for dwellings 5 – 7. According to the first variant, these dwellings existed at the end of the 5th – beginning of the 4th centuries BC. This corresponds very well with the sequence of building the dwellings: 6 → 7 → 5. However, storage pit 4, situated in direct proximity to the dwellings, falls out of the scheme, though the pit, similarly to dwellings 5 and 7, contained a retouched knife and a point. According to the second supposition, dwellings 6 and 7 existed during the 2nd century BC, while dwelling 5 refers to the 1st – 2nd centuries AD. Thus, dwelling 5 can be synchronized with storage pit 4, which corresponds to the succession of the construction of these dwellings. In addition, the period of existence of this group of constructions can be correlated with the dates obtained for dwellings 1 and 4, positioned some distance away from them, as well as with a fragment of a Poltse vessel found on the edge of the foundation pit of dwelling 4.

Conclusions

In the dwellings of the Ust-Talakan site, various artifacts (retouched stone knives, points, arrowheads) have been found, analogs of which refer to both the Uril and Poltse cultures of the Early Iron Age (Derevianko A.P., 1973, 1976). Considering the fact that in the Western Priamurye no sites of the Poltse Culture have been found as yet*, it is possible to hypothesize that the Talakan people were genetically related to late representatives of the Uril Culture. Thus on the Bureya River at the Uril Culture site of Malye Simichi, fragments of only the Talakan ceramics were found in the upper portion of a cultural horizon containing Uril artifacts. At the Sukhiye Protoki-2 site, among the ceramic sherds of thirty vessels referring to the post-Uril period, fragments of the Talakan Culture ceramics constitute 40.9% (fragments of approximately twelve vessels). At the multilayered sites of Sukhiye Protoki-2 and Bukinsky Kluch-1, layers of the Uril Culture as well as of the Middle Ages have been found. The medieval horizon contained ceramics of both the Talakan and Mikhailovka types. At Bolshiye Simichi, a site of the Mikhailovka Culture, Talakan ceramics have been found redeposited, just as at the Mikhailovka fortified settlement on the Zavitaya River (Derevianko E.I., 1975 213 – 214; Diakova, 1984: 84 – 85, 185). Finally, at the Bezumka site, a sterile sand layer has been found for the first time between the Uril Culture horizon and the layer with the Tlakan ceramics; the last, however, also contained several fragments of Mikhailovka ceramics (Nesterov, Alkin, Bogdanov, 1997: 262 – 263). This provides a reliable relative chronological sequence for the Iron Age and medieval cultures of the Western Priamurye: Uril – Talakan – Mikhailovka.

At present it may be conjectured that the Talakan Culture was developing synchronously with the Poltse Culture, but in different regions: the first one – to the west of the Lesser Khingan, while the second – to the east of this mountain range. In accordance with the recently obtained radiocarbon dates (Nesterov, Kuzmin, 1999: 142, table 1), the upper limit of the Uril Culture is placed at the 5th century BC (407 – 393 BC – the late complex of the Kochkovatka site); the radiocarbon dates for dwellings 5 – 7 of the Ust-Talakan site (in accordance with the first variant of the chronological interpretation) also allow their referral to the very end of the 5th – beginning of the 4th century BC. This draws together the end of the Uril Culture and the hypothesized beginning of the Talakan Culture. If further data corroborate this variant of the chronology, a continuous sequence of the evolution of archaeological cultures for this region of Priamurye may be constructed. Otherwise, if the second variant of the dating were accepted (2nd century BC – 3rd century AD), a chronological gap of two or three centuries between the end of the Uril Culture and the Talakan group of sites would appear. Then it would be logical to suggest that in Western Priamurye, the Uril Culture did not cease in the 5th century, but continued developing to approximately the 4th or 2nd centuries BC*, when it was replaced by the Talakan Culture.

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*In 1997, archaeologists from Blagoveshchensk examined a practically destroyed site at Lake Yama, near the village of Sergeevka. Based on a vessel of the Yayoi type and fragments of ceramics of this kind found there, they referred the site to the Poltse Culture (Bolotin, Sapunov, Zaitsev, 1997 156; Bolotin, 1999 110, fig. 1, *1, 2*). In dwellings 6 and 7 of the Ust-Talakan site, together with the pots of the Talakan type, large fragments of big vessels have been found, which can also be referred to the ceramics of the Yayoi type (see Fig 6, *1, 7*) In general, the question about the origin of Yayoi ceramics and its spread in the Far East and Manchuria is still debatable (Derevianko E.I, 1998. 239).

* The chronological attribution of the final stage of the Uril Culture depends on which variant is used to date the initial stage of the Talakan Culture.

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THE ONSET OF THE HUNNU PERIOD IN THE SAYANO-ALTAI

Introduction

The discovery and investigation of archaeological sites of the so-called Hunno-Sarmatian period in Gorny Altai over the last twenty years are of great importance to the archaeology of South Siberia. Excavations of more than ten large burial and ritual sites yielded abundant materials indicating complicated ethnic-cultural processes that occurred in the late 1st millennium BC – early 1st millennium AD in Gorny Altai. Using the results of recent archaeological studies of these sites and archaeological objects in Tyva, this analytical review summarizes the current state of understanding and recent literature on the problem of an early stage of the Hunnu period in the Sayano-Altai, one of the most fascinating chapters in ancient history.

As A.D. Grach reasonably noted, the notion of the 'Hunno-Sarmatian period' does not reflect the chronological or ethnic-cultural specifics of archaeological sites of this epoch in South Siberia and Central Asia In these territories, various archaeological cultures dating from the late 1st millennium BC to the first half of the 1st millennium AD were identified. These cultures differ greatly from each other and cannot be compared with Hunno-Sarmatian cultures (Grach, 1970: 101 – 102). In Russian historiography, the beginning of the Hunnu epoch is associated with "the crushing Hunnu military campaigns and the breakdown of Scythian-like cultures". Although this interpretation is of certain historiographical interest, it should be reconsidered because it resulted from an incorrect transfer of information from written sources onto archaeological data derived from territories remote from literacy centers. Moreover, the archaeological evidence demonstrates a radically different situation.

In the Sayano-Altai region, as well as over all of Eurasia, "substantial but still vague changes in the nomadic world" occurred in the 3rd – 2nd centuries BC, which resulted in the onset of a completely new epoch with a new historical content (Chernikov, 1960. 20 – 21; 1965: 73 – 74; 1975: 132, 135). With allowances for the cultural-chronological characteristics of the late 1st millennium BC sites, the final stage of the development of Scythian-like cultures is reasonably limited by the 4th – 3d centuries BC and the middle of the 2nd century BC (Mandelshtam, Stambulnik, 1980: 50 – 52; Mogilnikov, 1988· 78, 83; Surazakov, 1989: 104 – 114). Although the latter date is rather conventional, it is due to the fact that at that time, the late Scythian complexes coexisted with the developing cultural stereotypes characteristic of the Hunnu period, though vague and unclear (Trifonov, 1976: 118 – 119; Savinov, 1987: 9 – 10, 15 – 16). In this connection, Grach correctly indicated the inevitable presence of Scythian reminiscences in the cultures of the Hunno-Sarmatian period which were, nevertheless, characterized by new specific complexes of the material culture (1980: 5 – 6). In any case, the latest Scythian culture is partially connected with the subsequent period and should be included into another system of cultural coordinates. In this context, we should refer to an open question about the meaning and chronology of the "epoch of early nomads", the term proposed by M.P Gryaznov using socio-economic criteria (1939: 399 – 401). At present, this term is commonly associated with the Scythian period, although there is an opinion about broader chronological limits for this epoch (from the 7th to the 2nd centuries inclusive) (Novgorodova, 1984: 236). If we agree with this interpretation of the period of early nomads, we would have to accept its upper chronological limit, including the early stage of the Hunnu period. Following D G. Savinov, we suppose that the term "the epoch of early nomads" should be applied to the Scythian period only. Savinov emphasizes that in determining the

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upper chronological limit of the "epoch of early nomads", a pre-state level of social development of such societies must be taken into account; therefore, it is not correct to extend the term considered to the subsequent Hunno-Sarmatian period. Thus, the latest date of "the epoch of early nomads" is flexible, which is due to the local specificities of cultural development of the new epoch (Savinov, 1995: 80). If the spread of new cultural traditions took a longer period than the spread of similar traditions in the simultaneous stages or epochs, the chronological division of archaeological complexes dating to the Hunnu period allows us to understand more clearly events and their consequences. The periods of coexistence of the late Scythian and early Hunnu cultural strata were distinguished according to peculiar dynamics of the cultural-historical process in South Siberia (Savinov, 1991: 94; Vasyutin, 1991: 140 – 141).

However, diachronic studies of the Hunnu epoch are quite complicated, mainly due to the lack of an internal chronology of this period and reliable criteria for determining the sites dating to the beginning of the 1st millennium AD. The historical content of this epoch is of considerable importance, too. From the viewpoint of evolutionary development, which considers archaeological cultures of the late Scythian period as homogeneous, and therefore successive at all stages of their development, we may suppose that the Hunnu epoch partially overlaps the "epoch of early nomads" (i.e., the late stages of the Saglyn and Pazyryk cultures) in the Sayano-Altai. However, such a situation formed by the 1st millennium AD hampers reliable assessment of the differences even on the basis of an analysis of archaeological sources. Detection of differentiating criteria characteristic of a certain nomadic culture allows us to specify the differences between the complexes of the late Scythian and early Hunnu periods and offers certain prospects for future objective analysis of the dynamics of an entire culture and its specific variants in different parts of the Sayano-Altai. These results will certainly improve our understanding of the main tendencies of the historical development in the region.

Sites, concepts, and chronology

The Tyva Republic is a unique region where the sites of the Hunnu period were studied earlier than in other parts of the Sayano-Altai. The principal hypotheses and main problems of the Hunnu period were substantiated on the basis of the Tyva finds. In this connection, the Aimyrlyg burial site is of great scientific significance Using abundant finds and the successive chronology of this site, some researchers proposed a concept of the transitional period from the Scythian to the Hunnu epoch. On the one hand, this concept includes several opinions, according to which the upper chorological limit for the Scythian period can be extended up to the 2nd century BC inclusively. On the other hand, this concept is based on the hypothesis of the syncretism of the post-Scythian archaeological complexes exhibiting distinct Hunnu features. The data from these syncretic complexes, regarded transitional from the Scythian to Hunno-Sarmatian epoch, evidence a close affinity between the local traditions and the alien traditions during the last two centuries of the 1st millennium BC. Due to such interaction, a new culture had been formed at the BC/AD boundary and the first centuries of the 1st millennium AD at the latest. This long-term formation process occurred within the Hunnu period and implied certain subsequent stages of development (Trifonov, 1976: 119; Mandelshtam, 1983: 33; Mandelshtam, Stambulnik, 1992: 196 – 197). Another hypothesis suggests formation of a new Ulug-Khem archaeological culture in Tyva in the late 1st millennium BC. The characteristics of this culture are secondary burials in cists, which are sometimes enclosed in the above ground level portion of burials or tomb fillings of the earlier Scythian period (Grach, 1980: 5 – 6). Grave goods from secondary burials at the Urbyun III and Argalakty I sites (bone in-laid plates covering bows of the Hunnu type, arrowheads with split stalks, and bronze buckles with turned up hooks, all of the Hunnu type) favor this hypothesis to some extent. These data suggest that the Ulug-Khem burials date later than the log-chamber burials of the Saglyn Culture. The first intact secondary burial in a cist introduced into the filling of a log-chamber Saglyn burial was found for the first time in 1965 at the Urbyun III site by D.G. Savinov. Some grave goods (ceramics, bone in-laid plates for the Hunnu-type bow, arrowheads with split stalks, and a bronze plaque with the scene of a battle between a tiger and an eared griffin) find typological parallels in the materials of the Dyrestui burial ground and among Ordos bronze ware (Savinov, 1987. 38).

Group XXXI of the Aimyrlyg burial site is a key to understanding the ethnic-cultural processes of the second half of the 1st millennium AD. The site's planigraphy is highly informative for correlating the periods of construction of different types of burials. Although burials in cists, ground pits covered by barrow, and vaults are found in the rows of the Saglyn burial mounds (kurgans), they date to a later period by the stratigraphic data (sometimes they are enclosed in the Saglyn tombs) and the grave goods, as was noted above. A.M. Mandelshtam made a cautious conclusion that although the grave goods from the latest Aimyrlyg burials can be compared with the burials of the Hunnu or their relative tribes (Mandelshtam, 1983: 26 – 27, 33), the idea of distinguishing the separate Ulug-Khem culture should be disregarded because of the absence of principal differences between the Ulug-Khem sites and the Hunnu sites (Mandelshtam, Stambulnik, 1992: 197 – 198). We also note that the Ulug-Khem burial ground is not homogeneous. Its cultural integrity is "broken" by the vault burials, which can be compared to the Noin-Ula Hunnu tombs only in several construction elements (ring-shaped ground constructions, pit walls faced with stone slabs or coated with clay, pit bottoms covered with slabs) (Grach, 1970: 99 – 102). These differences were not explained by Grach within the framework of his hypothesis of the new post-Scythian culture in Tyva. Thus, the question of the dynamics and content of the cultural-historical processes in this region of the Sayano-Altai remains open. To solve this question, it is necessary to determine the chronology of the types of burial constructions, including the Hunnu sites Bai-Dag IV and Aimyrlyg, and the interactions between the populations bearing different cultural traditions.

There are a number of positive inferences concerning the critique of distinguishing the Ulug-Khem Culture. As proponents of the transitional period suppose, the diversity of funeral rites, types of burial structures, and grave goods may reflect the culture not yet having formed. Such a complex matches well the definition of the transitional period. The Kokel materials represent a culture in the course of its formation, and the Scythian component was a substrate of such a culture. The principal statement in this concept of cultural genesis in the region studied is that the replacement of cultures due to political events of the 3rd – 2nd centuries BC in Central Asia was not a one-step process. Also, as was reasonably noted, the dating of the late Scythian complexes is a difficult task because of the lack of imported goods. Therefore, the 2nd century BC – the date for the final stage of the Scythian culture – is rather speculative. Grach did not insist on an abrupt change of cultures and considered the possible existence of the late Scythian component in the course of transition to the Ulug-Khem cultural dominance (Ibid.: 102). The main reason for disregarding the transitional period was that the chronological gap between the Ulug-Khem and Kokel complexes was not taken into account. However, there are the cases when the Ulug-Khem burials were introduced into the Saglyn tombs (i.e., the Scythian period) and the Kokel burials into the later Hunnu tombs (also known as the Xiong-nu, Hsiung-nu) (for example, Group XXXI of the Aimyrlyg site)

Identification of the sites in Tyva, which are typologically related to the Hunnu sites, is of crucial importance for the entire Sayano-Altai region (Minyaev, 1981: 81 – 82; 1985: 75 – 78, plate I). The chronology of the Hunnu sites in Tyva revised by D.G. Savinov (late 2nd century BC – 1st half of the 1st century AD) (Savinov, 1991: 94, plate I) is very important for understanding the cultural situation and allows us to reinterpret the course of ethnic-cultural processes in the Hunnu period. On the one hand, the political situation in Central Asia in the 3rd – 2nd centuries BC did not lead to a one-step replacement of the Scythian culture with the Hunnu culture. On the other hand, this situation predetermined the appearance of a new population which had the custom of burying the dead in cists, thereby dating the final stage of the Scythian culture to the end of the 3rd century BC at the latest. From that time, the populations of different origin coexisted for a short period in one territory (the Saglyn population buried in wooden chambers and the Ulug-Khem population buried in cists). If the Ulug-Khem sites are regarded as an independent culture, the argument that the Saglyn population played a leading role in the formation of the Hunno-Sarmatian culture in the region should be reconsidered.

In Gorny Altai, the historical-archaeological situation is more clearly determined due to large-scale excavations of the burial sites of the Hunno-Sarmatian period over the last two decades However, no single factor could dictate the spread of the Hunnu cultural tradition in this region. It could be determined by many factors; for example, a stay of some groups of the Hunnu population in the Altai, migration of tribes that were under the Hunnu influence, incorporation of the Altai region into the sphere of Hunnu political influence, or epochal cultural changes caused by the formation of the first centralized nomadic state (Savinov, 1994: 144).

In this part of the Sayano-Altai, the sites comparable to the Tyva complexes (such as the Ulug-Khem, Hunnu, and Kokel burials) were never found. Hence, the formation of the cultures attributed to the Hunnu period was considered within the studies of the historical destinies of the Pazyryk population (Hudiakov, 1998: 97). Identification of the Hunnu complexes in the Altai was substantially hampered by raising the upper date of the Shibe stage of the Pazyryk culture (the 4th – 3rd centuries BC) and by the lack of materials corresponding to the subsequent period. However, as many researchers noted, this problem could have been solved if a radically new cultural-historical model of development had been employed. The most remarkable burial complexes for that time period are those of the Karasu I and II sites in the Central Altai. The internal burial structure of these complexes (a kind of a wooden facing or coffin inside a stone cist) is similar to that of the Hunnu burials in Tyva, while the grave goods found there (necklaces of jade square beads and bow cover plates, including the plates with an engraved image of the Siberian deer – maral) are analogous to those from the Central Asian Hunnu sites At the same time, the manner of burial (crouched on the left side, north-west or east oriented) found at Karasu I and II is related to the local Pazyryk tradition (Mogilnikov, 1985: 230). This new cultural layer differs greatly from the complexes attributed to the Shibe stage in the Central Altai, which is characterized by the tombs in wooden chambers with the accompanying horse burials and the corresponding grave goods (bronze medal-like mirrors, miniature *chekans* (battle axes), a bone comb, stemmed arrowheads made of iron, and belt buckles) (Kireev, Kocheev, 1988: 239, fig. 1).

To date, it has not been determined whether the latest date of ordinary burials of the Pazyryk culture belongs to the Hunnu period. Recent excavation results show that, probably, the onset of the Hunnu period in Gorny Altai coincided with the late Scythian culture. The ceramic fragments of Hunnu-type vessels found in the mounds of the Scythian burials (Uzuntal, Ulandryk) support this idea (Kubarev, Zhuravleva, 1986: 101 – 113, 118). However, it seems to be more appropriate to determine the time of the onset of the Hunnu period in Gorny Altai using the data on the late Scythian burials exhibiting clear traces of Hunnu cultural influence. The most valuable data were obtained from the burial sites in the Central Altai. In addition to the sites noted above, the Ust-Edigan burial ground is one of the most representative sites which yielded reliable information on the pattern of cultural genesis and formation in the region from the late 1st century BC and the first half of the 1st millennium AD. The planigraphic features of this site is of considerable importance in understanding the pattern of the cultural-genetic development Y.S. Hudiakov, the principal investigator of this site, proposes that the combination of topographical data and analysis of grave goods found in the two Scythian burial mounds further specifies the process of the formation of a new Bulan-Koba Culture, and reasonably suggests a genetic affinity with the late Scythian sites. In general, the Ust-Edigan complex differs substantially from the late Scythian burials and is characterized by new features formed under strong Hunnu and Sarmatian influences, evidenced by the weapons and prestigious equipment of mounted warriors. These innovations and transformations seen in the Bulan-Koba Culture are genetically related to both the previous culture and the migrations from Tyva, the Southeast Altai, and East Kazakhstan to the Central Altai (Hudiakov, 1998: 100 – 102).

The concept of cultural genesis proposed by Hudiakov provides an argument concerning the time of the formation of the Ust-Edigan complex showing distinct Hunnu features. Hudiakov believes that in Gorny Altai, the late Scythian complexes, synchronous to the Ulug-Khem Culture and the Hunnu burials in Tyva and several finds comparable to the Hunnu culture, may be attributed to the Hunnu period proper. Thus, the cultural changes usually explained by the Hunnu invasion are not confirmed by the archaeological evidence of the relevant period. Therefore the assumption about the existence of the Hunnu garrisons in the Sayano-Altai (location and time unknown) and the conquest of this region by troops consisting of tributary tribes remains speculative. A more reliable hypothesis accounts for the specific cultural genesis in Gorny Altai and implies the transformation of the Scythian culture in this region. As the author believes, the formation of the Bulan-Koba Culture should be dated not to the heyday of Hunnu political and military power, but to the period of its weakening (1st – 2nd centuries AD) (Ibid.: 110).

Generally following this scheme of cultural genesis, we note that it corresponds only to the Bulan-Koba Culture of the Central, Southeast and West Altai. Although the assumption of genetic links between the Bulan-Koba and Pazyryk cultures based on both the anthropological data and burial rite evidence can be considered valid and productive for further research in this direction, the chronological correlation between these cultures remains problematic, which is mainly due to the chronology of the Shibe stage. The Shibe burial site is dated to the 4th – 3rd centuries BC, and the remains of the subsequent Ulandryk stage, i.e., to the 3rd – 2nd centuries BC. Another group of burials (with skulls of animals placed in the eastern part of the tombs) combining selective traits of the Pazyryk Culture and burial traditions of the Hunnu period is also dated to this period in Gorny Altai. The burial complexes of the Central (several burials in the Ust-Karasu I and II burial grounds) and Southeast Altai (the Ker-Kechu, Kyzyl-Tash, and Elangash) indicate the first evidence of cultural influence of the Central Asia population from the period between the 4th – 3rd centuries BC (Soenov, Ebel, 1998: 91 – 92).

Burial complexes of the Ukok Plateau, with a series of distinct typological features in the land and intra-burial structures, can evidently be dated to the later period Although these sites are preliminarily dated to the early Hunnu period, their precise chronological and ethic-cultural attribution has not yet been determined (Molodin, Cheremisin, 1996: 47 – 49; Molodin, 1997b: 231 – 232). If further studies prove such an early preliminary date for undoubtedly non-Scythian Ukok burials Kaldzhin-6 and Ak-Kol-1, these sites will occupy a dominating position in the Sayano-Altai, similar to the synchronous post-Scythian Ulug-Khem sites in Tyva, thereby reflecting the ethnic-cultural situation in the region. Thus, the hypothesis of the period of coexistence of the Scythian and Hunnu cultural traditions (i.e , the post-Scythian period) will be considerably strengthened.

However, since the date proposed is still uncertain (because this date was obtained by the analogy of a single find – a gold-wire pendant with a cornelian – with the evidence from the Maoheshan site in the Jilin Province, China, which is not a burial complex (Molodin, Cheremisin, 1996: 47)), another interpretation of the chronological attribution of the Ukok burial sites is possible The Ukok burials show considerable typological correspondence to the burial rite revealed at Bai-Dag II and Aimyrlyg in Tyva, which are the closest complexes to the Hunnu culture of the Trans-Baikal region and Mongolia. In this case, it is possible to distinguish an entirely formed cultural complex of the new Hunnu epoch that existed long before the Bulan-Koba Culture This might explain the presence of the complex of Central-Asian origin in the late Scythian environment (the finds of Hunnu ceramics in the Pazyryk tombs filling). Further cultural development of a new population (evidenced by kilns for production of the Hunnu-type pottery as well as Bertek ritual sites, Ukok petroglyphic sites, and anthropological data) appears to be connected with the Ukok sites (Molodin, 1997a: 44; Savinov, 1994: 145; Chikisheva, Pozdnyakov, 1997: 155 – 157). The fact that this set of new cultural features was concentrated in the South Altai is mainly due to the specific geographic location of this territory. The Ukok valleys were convenient to travel from Northwest Mongolia and China to the East Kazakstan steppes, the Irtysh River basin, and the Central Altai (Molodin, Cheremisin, 1996. 49) A similar picture is seen in the Central and Southwest Altai (the Katun River basin) where the late 1st millennium BC sites of the early Bulan-Koba Culture are located.

Problems and future prospects

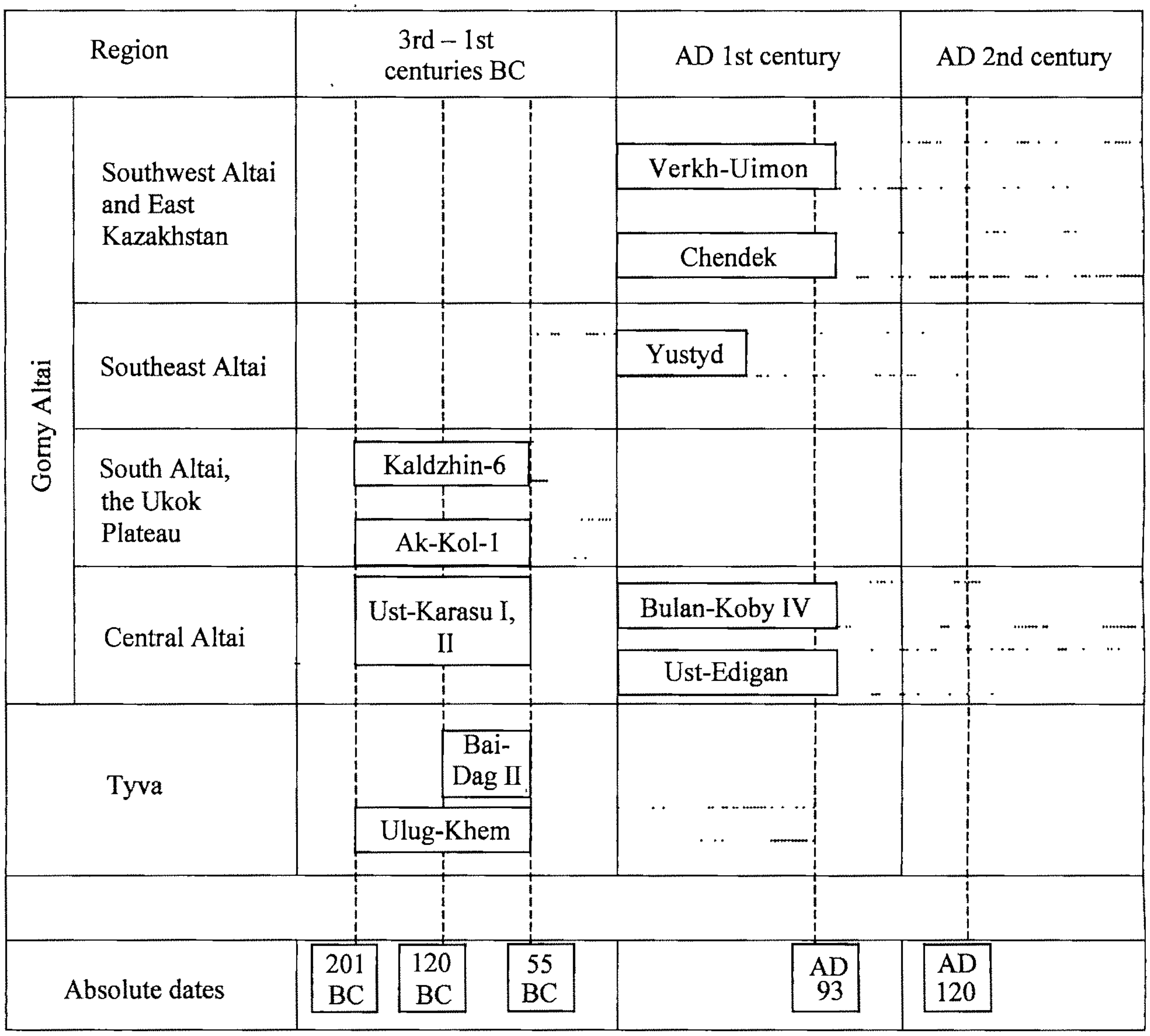
One of the key problems is the chronology of the Hunnu sites in Central Asia. The solution of this problem will facilitate future studies of various cultures, which appeared under the Hunnu or experienced its influence. This problem was discussed at a special session of the Department of Archaeology of Central Asia and Caucasus of the Institute of History of Material Culture (St. Petersburg) in 1997 (Minyaev, 1998: 391 – 393). The essence of this discussion can be summarized as follows: although the Hunnu cultural complex is often used for chronological attribution of other cultures or even single sites in the Asian steppe zone, its mature form is still unknown in the native Hunnu camp lands. Such complexes have been found only in the Trans-Baikal region, and North and partially South Mongolia. Contrary to Chinese sources, they are all dated to the period almost 100 years after the onset of the Hunnu conquest under *Shan-yu* Maotun reign (209 – 174 BC). This date was obtained by analysis of the *wu-zhu* coins, Han mirrors, and inscription data found among the materials of the Hunnu archaeological sites. The dates were identified either by a production date inscribed on an article, or, less accurately, by a character inscription manner that had been appreciably changing during the Qin and Han periods. According to Minyaev, although these objects were in constant use for a rather extended period, the fixed date of their manufacture is of greatest importance and would allow us to reliably determine the *terminus post quem* for most of the sites, including those located in the Trans-Baikal region (the Ivolga complex, Dyrestui, Dureny, and Noin-Ula). All these sites cannot be dated earlier than the 1st century BC Hence, these data suggest a need to revise a commonly accepted earlier date for the Hunnu burials based on written sources.

The dates of the Sayano-Altai sites showing the Hunnu elements may also be reconsidered and appear closer to the BC/AD boundary, to say nothing of a series of sites (such as Ust-Edigan, partially Verkh-Uimon, Bulan-Koby IV, etc.) reliably dated to the 1st – 2nd centuries AD. Not less important is the hypothesis explaining the contradiction mentioned between the written and archaeological data. Indeed, the Hunnu conquest caused intensive migrations of a large number of peoples and active cultural interaction to the east of the steppe belt. This corresponds to the initial stage (the late 3rd – first half of the 2nd centuries BC) of penetration and mutual influence of different cultural traditions. It was the time of the onset of significant cultural and anthropological transformation of the population of the Asian steppes. This process covered a few decades and was completed by the 1st century BC at the earliest with the formation of a typical complex such as the Hunnu culture in the Trans-Baikal region. Only after that, the main elements of this complex spread over the territory controlled by the Hunnu, who had left their homelands in the late 2nd century BC after a long war with the Han Empire recorded in literary sources (Minyaev, 1998: 291 – 292). Undoubtedly, this correction should influence considerably the relative chronology and local periodization of the pre-Turkic sites in the Sayano-Altai. Obviously, there was a certain time span between the establishment of Hunnu supremacy and the spread of various elements of the Hunnu culture (see Table).

Concerning cultural genesis and dynamics in the mountain areas of the Altai in the late 1st millennium BC, we note that the ethnic affiliation of the tradition of burying with a horse remains undefined (Savinov, 1987: 11) Moreover, the question of the successive affinity between the Kara-Koba and Bulan-Koba sites with allowance for the chronological gap between them has been yet unresolved (Globa, 1983: 120 – 121; Mamadakov, 1985: 188). However, the concept of a successive cultural development from the Hunnu period allows us to grasp the specificity of cultural genesis at that period. In the late 1st millennium BC, the cultural dynamics observed in Gorny Altai favored preservation of originally different cultural elements or objects of similar types in the neighboring chronological stages (post-Scythian, Hunnu, and Late Hunnu periods), which can be qualified as cultural succession. The idea of a transfer of cultural or even anthropological components from one epoch to another, beginning with the Hunnu period, should be regarded as a hypothesis.

The investigation of every period in the archaeology of Gorny Altai, from the post-Scythian to the Ancient Turkic period inclusively, appears to be highly promising within the framework of a historic-cultural approach. However, there is a negative tendency to regard all periods antecedent to the Ancient Turkic period as intermediate

Synchronization of the sites of the Hunnu period in the Sayano-Altai



· refers to changes in the chronological limits of the sites ------- refers to limits of absolute dates

links. This approach appears to determine the cultural-genetic status of the pre-Turkic sites *a priori*, thereby showing preference for a local cultural component. The opinion about direct contacts of the Hunnu and the late Pazyrykians based solely on the finds of fragments of the Hunnu-type vessels in the mounds of the Scythian Ulandryk and Uzuntala barrows cannot be accepted. There are numerous examples of the use of earlier burials for different purposes: for example, the mound and cover of tomb 60 in Ust-Edigan yielded animal and human bones and a broken vessel of a jar type decorated similarly to the Bulan-Koba ceramics (Hudiakov, 1998: 98, 100 – 102). A radical change of archaeological cultures in Gorny Altai at the beginning of the AD era cannot be explained as a result of their inner development. This is evidenced by a lack of the formed common culture in the Hunnu period and the component diversity of archaeological complexes (Shibe stage sites, burials from the Karasu I and II, Ust-Edigan, Uzuntal, and Ulandryk burial grounds, some finds from Belyi Bom II and Bulan-Koba IV). Historical-cultural processes in this region were determined by an influx of various ethnic groups during the Great Migration epoch (Mogilnikov, 1997: 220).

In Tyva, new cultural traditions are clearly recognized only at the final stage of the Scythian period (Savinov, 1987: 33 – 34) in the 3rd century BC. New traditions become dominant in the succeeding period, which is demonstrated by the widespread burials with stone constructions and grave goods of the Hunnu type. The sites of that period, differing from the Hunnu proper (the

Ulug-Khem Culture), form a stable cultural stratum of Central Asian origin, testifying to its new ethnic attribution.

Conclusion

The events of the period between the 3rd and 2nd centuries BC and the two subsequent centuries were more complicated than they appeared to be, when they were explained by the Hunnu invasion that destroyed the Scythian world. A novel approach to the events of that period was formed in the course of studying the Tyva sites (such as Aimyrlyg and Bai-Dag II) and revealing separate complexes showing innovations of Central Asian origin. In the Hunnu period, the influx of a new population to the Sayano-Altai shows the beginning of the migration from the eastern cultural-historic province, later named the Great Migration Period

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WAS GOLD MINED IN THE EAST SIBERIAN TAIGA IN THE SCYTHIAN EPOCH?

This question came to my mind when I was trying to date and culturally attribute two sites of the Scythian epoch located in East Siberia: the Korsukovo hoard found in the upper Lena River basin and a bronze *chekan* (a battle axe) from the Bolshoy Pit River, an eastern tributary of the Enisei River (Fig. 1). Although information about the Korsukovo objects was published twice (Berdnikova, Vetrov, Lykhin, 1991; Zuev, Ismagilov, 1995), the objects were dated and interpreted differently. Thus, on the basis of analysis of analogous objects from Siberia, the Ordos region, and even the North Caucasus, V.I. Berdnikova, V.M. Vetrov, and Y.P. Lykhin dated this hoard to the 7th – 6th centuries BC and proposed that it had been brought to the taiga forests of the Lena River basin from the steppe regions, which were more economically developed at that period (1991: 204). The illustrations given in the publication of the Korsukovo hoard by V.Y. Zuev and R.B. Ismagilov were poorer than in the previous paper. In fact, the analogs of the Korsukovo objects cited by the authors were not similar to them at all: the twisted body of a predator on an Early Zhou plaque, the animal images among the Kazakhstan rock art, and the famous Kelermess panther have nothing in common with the Korsukovo finds (Zuev, Ismagilov, 1995: 72 – 73; fig. 1, *2*; 2, *6 – 8*); the two panthers (according to the authors) depicted in heraldic postures on an Early Scythian pebble from Tuva (Ibid.: fig. 3) are different from the Korsukovo predators (V.E. Larichev believes that these animals are not panthers but a fighting horse and lion (2000: 71, fig. 1)). The only exact analog of the Korsukovo objects reported by Zuev and Ismagilov is a Kelermess spheroid *navershiye* (hereafter referred to as *terminal**). Thus, Zuev and Ismagilov, dating the Korsukovo hoard as far back as the 9th – first half of the 8th centuries BC, claimed that this hoard is "one of the most ancient roots of the Scythian culture" and proposed that the most ancient Scythian culture existed in Central Asia (1995: 74 – 75). The authors demonstrated their incompetence in working with archaeological materials and a violation of the basics rules of dating. These basic rules imply that one should cite only exact analogs from reliably dated complexes or, at least, these analogs should be almost identical with the objects from other reliably dated complexes.

Comparing different objects made in the animal style, the most important thing one should keep in mind is that it is not the species of depicted animals which is of crucial importance (i.e., whether the depicted animals are leopard, elk, or wild boars) but the peculiarities of their stylistic execution. Indeed, any leopard or elk looks like another leopard or elk, but their artistic style and position can be absolutely different. In fact, there is much in common between the Kelermess and Korsukovo spherical terminals; therefore, it is quite reasonable to use them in dating the Korsukovo hoard.

Using the date of imported bronze items, the most common date for the Kelermess finds is the 7th – 6th or early 6th centuries BC (Maksimova, 1954, 1956; Grakov, 1971) Although some researchers attribute the Kelermess finds to the 6th century BC (Korenyako, 1990; Kuznetsova, 1991, 1993), the 7th – early 6th centuries BC remains the most probable time of this complex (Galanina, 1997: 156, plates 44, 67, 300, 302). In their attempt to date the Korsukovo hoard, Zuev and Ismagilov note "round symbols with rhombs" (solar signs) on the tops of the Kelermess terminals (1995: 71). The authors believe that these symbols are reminiscences of the Novocherkassk epoch and suggest that these terminals

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* Terminal is any decorative adornment placed on top of an object (a rod or a weapon) The function of this element is unclear.

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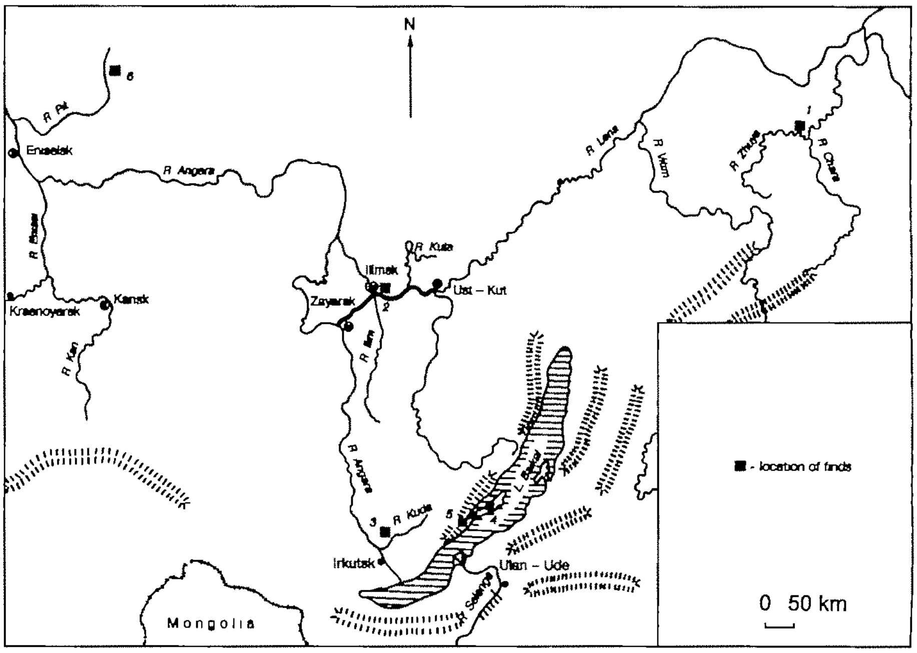

Fig 1. Map showing the locations of finds mentioned in the text.
1 – Korsukovo hoard, *2* – Ilim *navershiye* (terminal), *3* – terminal fragment from the Kuda River,
4 – stone-slab burial grounds of Khuzhir II and IV, *5* – stone-slab burial ground Kurkut IV,
6 – bronze *chekan* from the Bolshoy Pit River.

seem to have appeared between the 8th – 7th centuries BC at the latest. However, among the Novocherkassk finds, terminals were never found, and the solar symbols are seen only on cheek pieces and other articles. The solar symbols seen on the Kelermess terminals (note that only on some terminals) are Scythian reminiscences, which can be found at the Scythian sites up to the 6th century BC (Illins'ka, 1961: 56 – 58). Finally, as there are no solar symbols on the Korsukovo terminals (Fig. 2, *2*), the date proposed by Zuev and Ismagilov (the 8th – early 7th centuries BC or even the 9th century BC) is far from being reliable. The date suggested by Berdnikova, Vetrov, and Lykhin is correct, which is supported by several additional observations (Chlenova, 2001) omitted in this paper. I will cite only the most recent facts.

Let us consider the Korsukovo objects in order to provide their cultural attribution and determine their relation with other regions. The Korsukovo hoard contains a cup-shaped bronze cauldron on a base with two vertical handles (see Fig. 2, *1*). Such cauldrons are typical of the Scythian epoch. It is possible to date this cauldron more precisely by attributing it to dates obtained for other Korsukovo objects. The cauldrons of this type were found in the stone-slab tombs of the Trans-Baikal region, Mongolia, and Ordos (Chlenova, 1993: fig. 10, *1 – 14*; Sosnovskii, 1941: fig. 14, *3*).

The following articles were placed inside the cauldron: a spherical bell-terminal, a pair of feline figurines depicted in a high-relief technique with a flat grate reverse side, a pair of terminals depicting elk without antlers (young male elk or female elk?) whose body is made in the form of a hollow bell with holes, and a bent hook with a loop at the upper end for hanging and an animal's muzzle depicted with bared teeth at the lower end. Closer to the upper end, an elk being chased by a feline is depicted, and the middle part of the hook shows a figure of a crouched feline (according to (Zuev, Ismagilov, 1995: 69)) or a snake (according to (Berdnikova, Vetrov, Lykhin, 1991: 198)) (see Fig. 2, *1 – 6*). In addition to the items listed above, the person who found that hoard stated that the cauldron contained "a bronze bar with standing hollow figurines of goats or bulls with small beads inside; these figurines were placed against each other." Obviously, this object (probably, a terminal) was lost (Berdnikova, Vetrov, Lykhin, 1991: 196, app. 1).

The date of the spherical terminals has been mentioned above. I would like to add that although terminals of this type originating from the vast territory between the Kelermess and the upper Lena River basin are still unknown to us, as you will see below, the terminals in the form of animals with bell-shaped bodies similar to those from the Korsukovo hoard are reported from Siberia and the Ordos region. The two Korsukovo terminals depict elk with hollow bodies; the thigh and scapula bones of the elk are shown with rhomboid cuts, and a long slit running along their chests. The elk are shown with bent knees standing "on the tiptoe" of their hoofs that are attached to low supporting props. The eyes and nostrils are shown by small cylindrical ducts placed across the muzzles; the mouths are slightly open. Although the elk figurines have many common features, one can note several differences between them. One elk (see Fig. 2, *5*) has a dewlap on the neck (probably this is a male elk), its ears are bent toward the back (almost "pressed" to the back), its hoofs are not split, and it has a short tail. The right prop has a trapezoidal hole, and the left prop has two round holes; a ring is attached to the prop. The second elk does not have a dewlap and a tail but has erect ears and split hoofs; the supporting prop has triangular holes (see Fig. 2, *6*). These stylistic features are typical of the

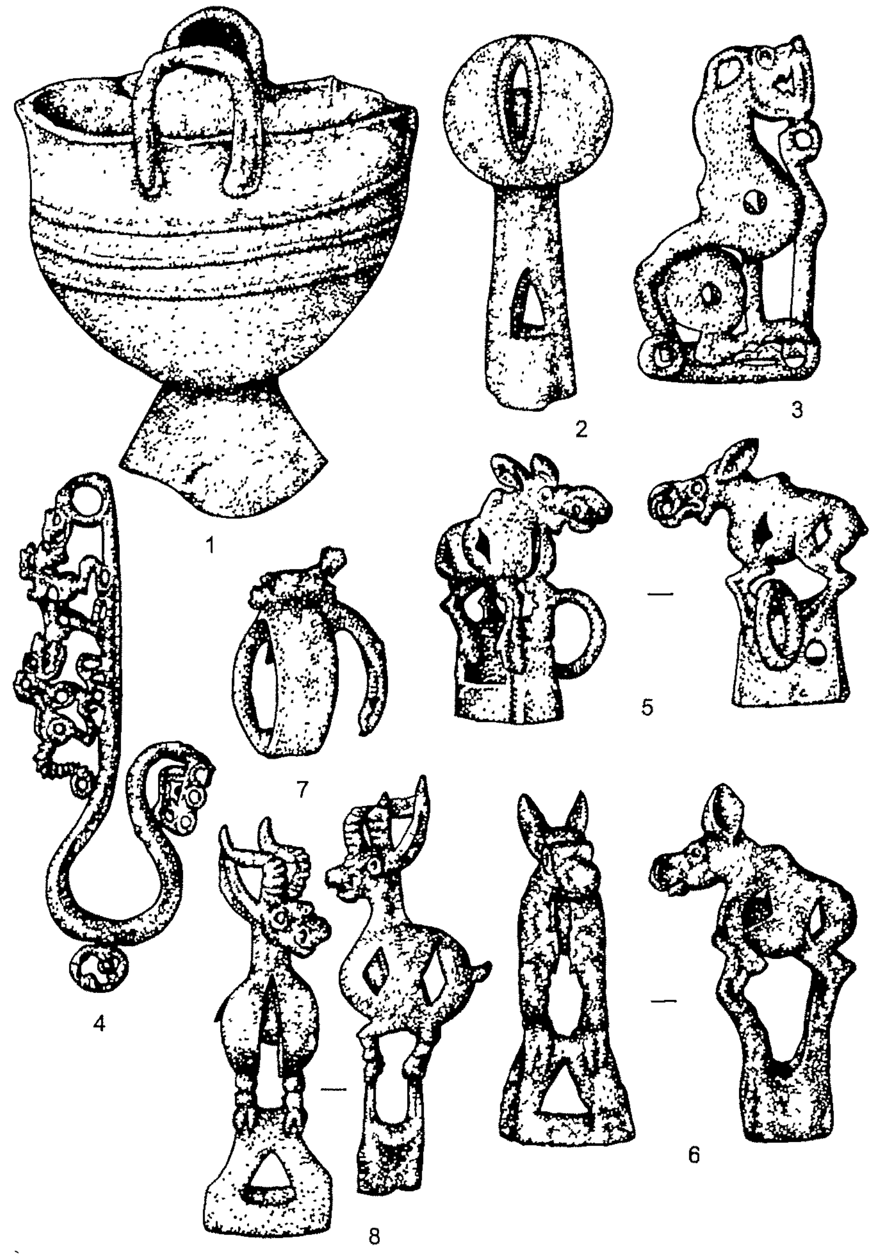

Fig 2. Korsukovo hoard objects (*1 – 6*) and their analogs from East Siberia (*7, 8*) (after (Berdnikova, Vetrov, Lykhin, 1991)).

animal images on both the Korsukovo objects and other bronze articles found in the East Siberian taiga. A terminal found near Ilimsk (Irkutsk Province) is stylistically the closest to the Korsukovo terminals (see Fig. 2, *8*) The Ilimsk terminal depicts a mountain goat with a bell-shaped body and a bead inside; rhomboid holes denote its thigh and scapula bones, and a long slit is seen on its chest; its knees are bent and the tips of split hoofs are attached to a low pyramidal supporting prop with triangular holes on the long sides and rectangular holes on the short side. The mouth and eyes of the goat are shown as tubes lying perpendicular to the muzzle, and the mouth is slightly open*.The differences indicated above distinguish the Korsukovo and Ilimsk terminals from the Ordos terminal (Fig. 3, *1*) or a terminal found near the Shtabka village (Barnaul region) (Umanskii, 1970: fig. 1). Thus, unlike the Korsukovo and Ilimsk terminals with rhomboid holes, the Ordos and Shtabka terminals have narrow lens-shaped holes. The difference is that these narrow holes cover the thigh and scapula areas of the Ordos figurine, and they only contour these parts of the animal on the Shtabka terminal (Ibid.). This shows that ancient craftsmen from the Ordos region, the steppe Altai, and the East Siberian taiga had a common feature: they tended to mark animals' thigh and scapula parts by holes. However, in East Siberia, craftsmen preferred to make only one lozenge-shaped hole on their figurines. I am aware of only two animal-shaped terminals with lozenge holes – those are from the Korsukovo hoard and from Ilimsk.

Interestingly, the holes (though round ones) denote thigh and scapula parts on animal figurines found in the Ordos region and North China, and also on the animal style objects attributed to non-Chinese nomadic tribes (see Fig. 3, *3 – 6, 9*). The tradition to distinguish the thigh and scapula parts (but not by holes) is known in other territories as well. The only example of holes on the thigh and scapula parts of an object found in the taiga territory (probably in the vicinity of Krasnoyarsk) is a goat on a bronze "bell" from the collection acquired by G.F. Miller (Chlenova, 1967: plate 28, *27*; Zavitukhina, 1983: 31, N 4, 98, N 4). There are no such holes on similar goats on bronze "bells" (Zavitukhina, 1983: 97 – 99, N 1 – 10). Comparable to other artistic peculiarities characteristic of the 800 – 700 BC Eurasian cultures, such holes appear on the remains of taiga cultures in later periods.

Bell-shaped terminals are reported from the North Caucasus, Cis-Caucasus, and the Ukraine. These terminals are surmounted only with an animal's head, a head of a predatory bird or a griffin, or, more rarely, with a deer's figure (see (Perevodchikova, 1980. fig. 3, *7, 8, 11*; fig. 4, *6 – 8*; fig. 5, *1 – 3*)). From the Caucasus and Ukraine, terminals-bells in the form of an animal's body with a head, legs, and tail have not yet been reported. Therefore, the Korsukovo terminals are closer to the Ordos specimen than to those from the North Caucasus. This is evidenced by the other animal-style terminals from the Ordos region in which the animal bodies do not have the form of a bell and whose legs are acutely bent at the knees (like those of the Korsukovo elk; see Fig. 3, *2*).

Another interesting feature of the animal style of the Korsukovo objects is that the felines' tails are edged with numerous cuts (see Fig 2, *3* and (Berdnikova, Vetrov, Lykhin, 1991: fig. 4)). These cuts are seen on the objects from the stone-slab tombs in the Trans-Baikal region (the figurines of two animals with twisted bodies (Tsybiktarov, 1998: fig. 53, *16*)), a coiled feline predator (from the burial ground near Ononskoye (Kirillov, 1979: fig. 9, 22)), and on similar figurines of coiled feline predators enclosed between prominent squares found in the Ordos region and North China (Chlenova, 1967: plates 27, 37, 40) During later periods (in the second half of the 1st millennium BC), this technique of edging plates and other objects was used in the forest-steppe region of the Ob River basin (Mogilnikov, 1997: fig. 41, *5*) and other territories. Finally, the handle of a bronze dagger in the so-called "Ordos style", which depicts a predator chasing a herbivorous animal (in this case, a tiger chasing a goat) is similar to the scene of "chasing" (or, most probably, the scene of the beginning of a torment) seen on the hanging hook from the Korsukovo hoard. The Korsukovo elk has four bent legs, while the Ordos goat and tiger have their hind legs bent and their front legs stretched (cf. (Ausstellung…, 1934. plate 5; Berdnikova, Vetrov, Lykhin, 1991: fig. 6), Fig. 2, *5*; 3, *10*; 4, *6*). The Ordos dagger was found outside an archaeological complex and it was dated by the Scythian stylistic features of the images: the style of these images is modified (a very thin goat and the two animals look a little awkward). Probably, this dagger has a more recent date than other Korsukovo objects. Generally, Ordos craftsmen liked to show a row (see Fig. 3, *9*) or even two rows (see Fig. 3, *4, 5*) of "crouching" predators (Loehr, 1951: plate VI, *37*). This was also typical of the artistic style of the non-Chinese population of North China. For example, this style is seen on the finds from the Xiaoheishigou burial ground (see (Kovalev, 1998: supplementary plate, fig. 1, 2, 7), Fig. 3, *4, 5*). A.A. Kovalev dates this complex to the "9th or, at the latest, early 8th century BC" (1998: 127). He believes that the specimen of the Scythian-Siberian animal style found in the burial grounds of the Nanshangen type, including the Xiaoheishigou site, date as far back as the 60s of the 7th century BC at the latest (Ibid.). Such diversity in the dates seems at least surprising. The earliest dates are obtained from the ritual Chinese bronze vessels found in these tombs. These vessels were imported or captured during the military campaigns of northern nomadic tribes into China, where these vessels could have been preserved for centuries as ritual objects. Kovalev (Ibid.) relates the Xiaoheishigou tombs with northern

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[*] Several terminals similar to the Ilimsk terminal have been reported to come from Minusinsk (Krasnoyarsk Territory) (Salmony, 1933: plate V, *2*, captions) and the Ordos region (Artamonov, 1973: 116). Zuev and Ismagilov mentioned the latter terminal in their paper (1995 72). Unfortunately, this is a mistake because other such terminals were never found. Only one terminal of this type was found in Ilimsk and published (Chlenova, 1967· plate 29, *41*) At present, it is deposited at the Irkutsk Regional Museum Berdnikova, Vetrov, and Lykhin established the place where it was found (1991 fig. 1) – the Ilim River – and I corrected their data according to the paper by Borovko (1931). The corrected place of the find is the town of Ilimsk. It should be noted that neither the Minusinsk nor the Ordos terminals exist To prove this fact, we note that there is not a single terminal found in the Minusinsk Basin among the total of bronze articles deposited at the Minusinsk Museum, State Hermitage (St. Petersburg), and other Russian museums, which I visited in the 1950s and 1960s (except for the so-called "goats on bells", which is an absolutely different category of bronze objects). In addition, the terminals published by Borovko, Chlenova, Berdnikova, Vetrov, and Lykhin, Salmony, and Artamonov are identical to each other. The Scythian terminals of such identical form and style found in three regions remote from one another are unknown

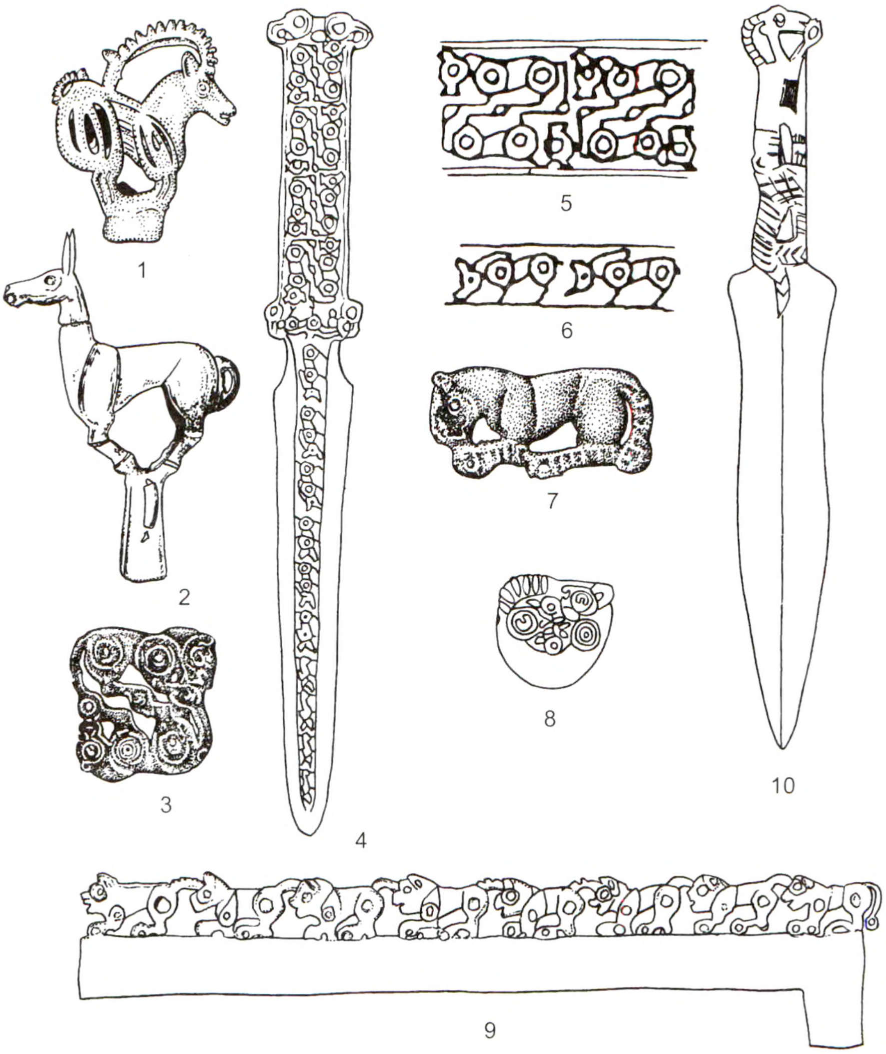

Fig. 3. Ordos and North Chinese analogs of the Korsukovo objects.
1, 2, 9 – from the Ordos region; *4 – 8* – nomadic objects from the Xiaoheishigou tomb from the 1985 excavations (*5* and *6* are the dagger decorations); *10* – the Ordos-style dagger. *1, 2* – after (Salmony, 1933); *4 – 8* – after (Kovalev, 1998); *9* – after (Andersson, 1933); *10* – after (Ausstellung…, 1934). Bronze. Scaling of the objects is different.

nomads and even shows the routes of the military campaigns of these tribes to China in the 8th and 7th centuries BC. This fact is the best evidence that imported goods (especially ritual objects made of durable materials) cannot always be used for dating archaeological complexes. Concerning animal art objects from the Xiaoheishigou burial ground, there are two of them that can be dated according to the Eurasian chronological scale: the distorted image of a coiled feline that can be dated as far back as the 6th century BC (Ibid.: supplementary plate, fig. 1, 6) (see Fig. 3, *8*) and a dagger with a terminal and a ricasso (an element of a dagger that distinguishes a hilt from a blade; often decorated with images of animals, geometric figures, etc.) depicting the heads of predatory birds, similar to those found in the Asian steppes and mountains (for example, in the Aimyrlyg burial ground in Tuva (Mandelshtam, 1992: plate 78, *34*), the Kumurtuk burial site in the Altai (Kiselev, 1949: plate XXX, *11*), and in the Minusinsk Basin, where 36 similar daggers were found among which there were some iron specimens). We note that iron first appeared at the end of the Tagar period*. Daggers with terminals and ricassos in the shape of predatory-bird heads were found in the Ordos region (Salmony, 1933: plate XXXIX, *2*) and tomb 58 of the Maojinggou burial ground. Zhong Suk-Be (1998: 8 – 9) attributed the latter tomb to the late Chunqiu period, most probably to the 6th century BC. An exact analog of a dagger blade with cuts located right under the ricasso, which was found at the Xiaoheishigou site, was discovered in the Ordos region (Andersson, 1932: plate VIII). The terminal of the Ordos dagger is made in the form of an animal figurine (a feline predator?), and its ricasso is in the form of the distorted heads of predatory-birds of the same kind as the birds from Xiaoheishigou, which does not contradict the date "the 6th century BC at the earliest."

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* See in more detail about the daggers with terminals and ricassos in the shape of predatory-bird heads in (Chlenova, 1981: fig. 4, *9 – 17*, p. 11).

Thus, the Xiaoheishigou complex cannot be dated earlier than the 6th century BC, or to be more exact, the end of the 6th century BC. On the handle of the dagger found in Xiaoheishigou, one can see two rows of schematically shown feline predators with stretched paws and concentric circles on their thighs and scapula. Another plaque from the Xiaoheishigou complex has a pair of feline predators with their heads on different sides, and each of these felines has round holes surrounded by concentric circles on its thighs and scapula bones (Fig. 3, *3* – *5*). We note that a hoof-like mark is seen on the croup of a coiled predator, which is typical of the Eurasian art style objects of the 7th – 5th centuries BC (see (Chlenova, 2000: 101, fig. 10)). The tail of this predator is covered with transversal lines – a variant of cuts on the tail of the Korsukovo predator. Thus, the 6th century BC Xiaoheishigou complex is of greater importance for dating the Korsukovo hoard. This is why I have paid a great deal of attention to it.

I am unaware of any other motifs originating from other parts of the "Scythian world" that show rows of crouching or "scratching" animals, except for one image of two feline animals (they were found on a golden sword plate from barrow 53 in the South Tagisken burial ground, which is dated to the late 6th – early 5th centuries BC (Itina, Yablonskii, 1997: 69, fig. 43; 44, *5, 6*)). Stylistically, these motifs and the Korsukovo and Ordos images of predators are very different.

There are some other artistic traditions seen in the feline images from the Korsukovo hoard (open mouths with bared triangular teeth (see Fig. 2, *4*)) that were common throughout the Asian part of the Eurasian steppes*. On the objects derived from the European part of the Eurasian steppes, the mouths of archaic feline images are closed but their teeth are seen. We note that the Korsukovo leopard has enormously long fangs. The well-known Kelermess golden panther also has long fangs (its fangs are bared) (Sokrovishcha…, 1966. plates 22, 24), which allows us to compare and synchronize the Korsukovo and Kelermess finds.

Finally, all archaic animal images of the Scythian animal style found both in the European and Asian parts of the Eurasian steppes have round eyes, round ears (and sometimes nostrils), and round ends of their tails (felines).

Thus, the artistic style of the Korsukovo objects and the Ilimsk terminal can be classified as archaic East Siberian style, which belongs to the more common tradition spread over a vast territory which includes the Ordos region, the parts of North China adjacent to Inner Mongolia once populated by non-Chinese tribes, and certainly Mongolia and the Trans-Baikal region of the "deer stone" and stone-slab tombs epochs. Unfortunately, there are not so many bronze objects found in Mongolia and the Trans-Baikal because of an insufficient level of archaeological exploration in this region and the fact that almost all stone-slab tombs were robbed. However, the belt hook-pendant from the Korsukovo hoard finds close analogs in numerous Mongolian "deer stones" where there are not only motifs with double hooks of the П-form (the dominant type) but also some single pendants (see (Volkov, 1981: plate 113), Fig. 4, *1* – *4*). A similar double bronze hook was found in the stone-slab tomb N 68 of the Tapkhar burial ground in the Trans-Baikal region. This hook also resembles a hook depicted on a "deer stone" in Mongolia (Sosnovskii, 1941: fig. 14, *1*; 18). In addition to this hook-like pendant, the belt includes a dagger similar to those found in barrow N 41 in the 7th – 6th BC burial ground of Tunchukh, located in the south of the Minusinsk Basin (excavations by E.A. Sevastyanova, 1975) (Chlenova, 1997: fig. 25, *3*). Several other double and single hook-like pendants similar in shape to the Korsukovo pendant were found in the Ordos region. On these pendants, scenes of a feline chasing some herbivorous animals (or beginning of combat) can be seen, but they are depicted in a style different from that of the corresponding Korsukovo motif (cf. Fig. 2, *4* and 4, *6*). The fact that a hook-like pendant and a Scythian-type vessel were found among the Korsukovo objects and that the same set was found in the stone-slab tombs suggests that the Korsukovo objects probably belong to the Culture of the Stone-Slab Tombs of the Cis- and Trans-Baikal regions (another fact in favor of this assumption is that the metal of the Korsukovo hoard – tin-lead bronze – is typical of the bronze objects found in the 7th – 6th century stone-slab tombs in the Trans-Baikal (Sergeeva, 1991: 206 – 207)). From that territory, the hoard could have been brought to the Zhuya River where it was found. The Zhuya River is located in the same basin as the Olekma River, which is the eastern tributary of the Lena River The territory the Zhuya River flows through is an almost uninhabited northern taiga forest. According to the data collected in the 1930s, hunting and fishing are the only economic activities possible in these territories (the Yakuts, who came to the Lena basin in the Middle Ages, are engaged in cattle breeding in the wide flood plain lower than the Olekma River). An extremely severe climate and permafrost made this territory unsuitable for

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* I V. Yatsenko mentioned this fact in her unpublished report at the conference devoted to the 100th anniversary of B.N. Grakov in 1999.

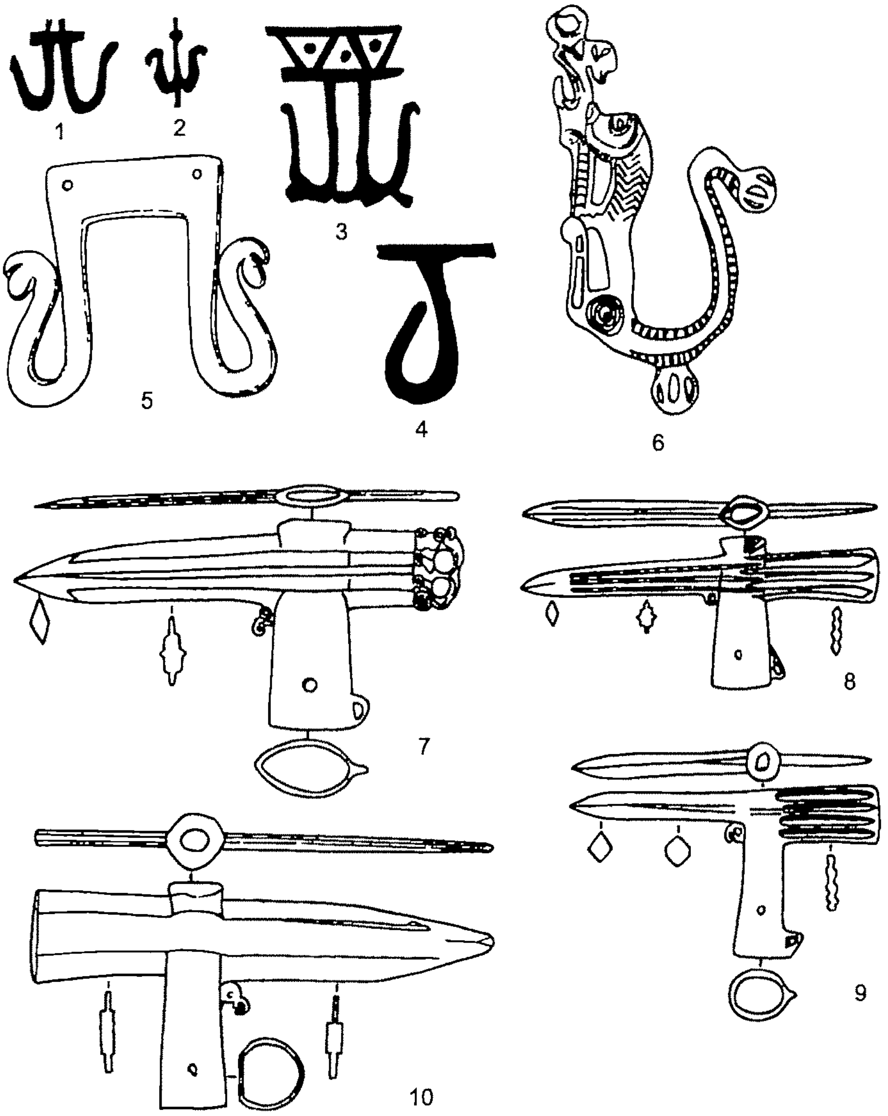

Fig 4. Analogs of the Korsukovo hook-pendant *(1 – 6)*, a ***chekan*** from the Bolshoy Pit River *(7)*, and its analogs *(8 – 10)*.
1 – 4 – from deer stones of Mongolia (after (Volkov, 1981)); *5* – from stone-slab tomb N 68 of the Tapkhar burial ground, the Trans-Baikal (after (Sosnovskii, 1941)), *6* – from the Ordos region (copied from a photograph, after (Janse, 1935)); *8, 9* – from the Kansk region (after (Chlenova, 1967)), *10* – from Elekmonar on the Katun River, Gorny Altai (after (Chlenova, 1995)). Bronze. Scaling of the objects is different

either agriculture or cattle breeding. This place could not be a homeland for nomadic tribes or, moreover, the original land of the Scythians.

How and why was the Korsukovo hoard brought into this taiga solitude? Trying to find possible answers to these questions, we have to keep in mind that the Korsukovo finds are not an artisan's hoard or things collected from a warrior's tomb (although there are some warrior's belongings such as a hook with a "chasing" scene similar to the objects depicted on the deer stones in Mongolia and found in the stone-slab tombs) This hoard contains neither weapons nor horse harness elements: it is a collection of highly artistic bronze ware. In addition, one should take into account that the place where the hoard was found is the famous Lena–Vitim or Vitim–Chara gold field, and there is also gold in the Zhuya River (see (Zhuya, 1929: 987; Lensko–Vitimskii zolotonosnyi..., 1932: 78 – 79)). It is well known that gold was of great importance even at the beginning of the Scythian period. In my previous paper, I proved the assumption that people used the so-called "Herodotus trade route" to obtain gold, and they offered mirrors in trade for gold (Chlenova, 1983: 60). This route passed from the northern shore of the Black Sea to the southern Ural Mountains and can be traced by the finds of the Olvia-type mirrors (Grakov, 1947). We can suppose that the people of the Stone-Slab Culture went to the Zhuya River seeking gold and that they took their artistic bronze objects with them in order to exchange them for gold, as the Korsukovo objects are as beautiful as the Olvian mirrors. This route can be traced in detail. Obviously, its starting point was somewhere in the Cis-Baikal region, in the upper Angara basin of the Kuda River, an eastern tributary of the Angara River. (A small terminal with an animal figurine was found there) (see Fig. 2, *7* and (Berdnikova, Vetrov, Lykhin, 1991: fig. 10)) Then, the route followed the Angara River to the vicinity of the Zayarsk settlement (Zayarsk, 1952: 535). At this time, this village does not exist. The dismounted travelers then reached the Ilim River, an eastern tributary of the Angara River, at the place near the location of the former town of Ilimsk, presently non-existent. This place was the most convenient for passage from the Angara River to the Ilim River, because the Angara River south of the Zayarsk village has many rapids and riffles. This location is now covered by the Bratsk hydro-power station reservoir and the Ilim River, located above it, is not navigable (see (Ilim, 1931: 231)). In Ilimsk, a goat-shaped terminal was found that is stylistically similar to the elk-shaped terminals from the Korsukovo hoard (see Fig. 1, *2*; 2, *8*). From Ilimsk, ancient travelers crossed the Lena River in the area of modern Ust-Kut (the so-called "Ilimsk portage"; in more recent times the Ilimsk route has been established here). Then, the travelers followed the Lena River to the mouth of the Vitim River. From that point, the route to the Zhuya River (the place where the Korsukovo hoard was found) is not clear, because no diagnostic artifacts have been found on this portion of the river. However, there could be at least two possible routes: one could travel up the Vitim River to the Bolshoy Patom River with passages on the Khomolkho River, and then to the Zhuya River. Another route was down the Lena River to the mouth of the Olekma River and then up the Chara River, a tributary of the Olekma, into which the Zhuya River flows (see (Karta Irkutskoi oblasti, 1953)).

Both of these routes are extremely difficult, because people had to move up the rivers. However, the second variant seems more logical as travelers could float down the Lena River for a longer time, and there are no mountain ranges which they had to pass if they chose the first route. If we assume that the departure point was not in the Cis-Baikal region where intact 7th – 6th century stone-slab tombs have recently been discovered on the Olkhon island (Kharinskii, Zaitsev, Svinin, 1995: fig. 6, *1, 2, 8, 15, 19*; Tsybiktarov, 1998: fig. 95), but in the Trans-Baikal where a large number of the stone-slab tombs have been found, people had to cross Lake Baikal prior to the route described above. A direct way from the Trans-Baikal down the Vitim River to reach the Lena–Vitim gold basin was hardly possible, because the upper stream of the Vitim River is not navigable. Up to the present-day town of Bodaybo, there are numerous rapids and riffles (see (Vitim, 1929: 489; Vodnye puti, 1929: 509)). Near Bodaybo several bronze celts were found, which suggests that people reached this region in the Early Iron Age by following the Lena River in their search for gold. Another natural treasure – fur – could have been obtained in the more southern regions, closer to the area of the Culture of the Stone-Slab Tombs Several gold objects are reported from the stone-slab tombs of the eastern Trans-Baikal: a neck decoration (the Stantsiya Olovyannaya burial ground), a bracelet, and a bead (the Barun Kondui burial ground) (Tsybiktarov, 1998: fig. 55, *4, 5*). Obviously, these objects were made of gold mined in the rivers of the Nerchinsk and Shilka gold fields (see (Zoloto, 1931: 174)). Several golden hair-pins in the form of sheep's heads were found in the Tebsh-uul burial ground (Uber-Khangai district, Mongolia) (Volkov, 1972: 555 – 556; Tsybiktarov, 1998: fig. 55, *4, 5*). These hair-pins could have been produced from the gold mined in the southwestern Altai. In the western Trans-Baikal, gold was found along the Chikoi and Dzhida rivers (see (Zoloto, 1931: 174; Zabaikalie, 1929: 31)), and the bearers of the Culture of the Stone-Slab Tombs could have used this gold. Objects made of this gold were not found in the western Trans-Baikal stone-slab tombs, because all graves were pillaged; the more numerous eastern Trans-Baikal stone-slab tombs contained only two or three golden articles. In the Cis-Baikal, there are no gold fields; therefore, the population of this territory could have set out in their search for gold to the Zhuya River. Inhabitants of the Trans-Baikal region could have looked for new gold-bearing rivers as well.

Most likely, the Zhuya River was not the only place in the East Siberian taiga where gold was mined in the Scythian epoch. For instance, a remarkable bronze battle-axe *chekan* with a flat figurine of a standing predator on the head and a predatory bird's head in the junction between the striker and the sleeve was found in the upper stream of the Bolshoy Pit River (to the north of the present-day town of Eniseisk, see Fig. 1, *6*; 4, *7*) (This place of discovery was established in a publication by M.P. Zavitukhina (1983: 70, N 185, fig. 185)). The *chekan* from the Bolshoy Pit River is similar to *chekans* from the Minusinsk Basin and the Krasnoyarsk region. Eastern tributaries of the Bolshoy Pit River have gold (see (Eniseiskii zolotonosnyi raion, 1929: 891)), and they cross the taiga. We might suppose that the owner of the *chekan* came to this region in the search for gold carrying his weapon with him, which was undoubtedly necessary for him, especially if other gold-seekers were roaming the region. Unfortunately, we do not know anything about the conditions of this find According to Y.S. Grishin, in the 1970s, an exhibition in the Eniseisk Museum had two or three celts of the Krasnoyarsk–Angarsk type, and two or three bronze *chekans*, one dagger (probably, they were of southern origin and corresponded to the Scythian epoch, because in more recent epochs bronze *chekans* were not used), and a bronze handle of a cauldron. These were also recorded in the museum's inventory. However, one cannot be sure that the *chekans* once deposited with the Eniseisk Museum were found in the vicinity of Eniseisk. The founder of the Minusinsk Museum, N M Martyanov, donated some "natural-historical collections" to the Eniseisk Museum (Eniseisky muzei, 1929· 896), and these collections might have included the *chekans* found in the Minusinsk Valley. Unfortunately, Grishin failed to find these *chekans* in the collection of the museum*.

The celts from the Eniseisk Museum, at least those in the exhibition noted by Grishin and those recorded in the museum's inventory book as the celts of the "Krasnoyarsk–Kansk type", were found somewhere in the vicinity of Eniseisk. The museum collection was founded by A.I. Kytmanov, a gold miner who was born in this region and whose ancestors were also gold miners (Eniseisky muzei, 1929: 896; Kytmanov..., 1931: 1147). Grishin (1982: fig. 1, *1*) published an illustration of a bronze mold for casting celts of the Krasnoyarsk–Angarsk type from the Eniseisk Museum. Taking the above information into account, one can suppose there is a close relationship between the Eniseisk – Bolshoy Pit region and Krasnoyarsk – and the more eastern (taiga) territories such as the Angara River, Chadobets River, etc. Undoubtedly, celts (as tools for chopping trees) were necessary in the taiga, and they were obviously cast directly at the location they were needed if there were enough supplies of copper, as near Eniseisk (see (Krasnoyarskii okrug, 1931: 1037)). This idea is supported by the discovery of different celts in the Kansk region, which is a small steppe area surrounded by taiga and connected by a forest–steppe passage with Krasnoyarsk. These celts were published many times (Merhart, 1926: 40 – 54; Maksimenkov, 1960; Generalov, Dzyubas, 1995). We note that there are gravel deposits of gold in the Kansk region and in the taiga rivers of the Kan and Mana river system (Kanskii zolotonosnyi raion, 1931: 508). Nevertheless, not only gold attracted the population of the Scythian epoch into this region but also opportunities for cattle breeding and even agriculture, which is shown by the numerous bronze tools and weapons of both the Minusinsk and Krasnoyarsk–Kansk type that have been found.

Although the *chekan* from the Bolshoy Pit River is similar to the Tagar *chekans* and those found near Kansk and Krasnoyarsk (see, e.g., (Radlov, 1894: plate XVII, *1*, Chlenova, 1967: plate 7, *4 – 9*), Fig. 4, *8, 9*), some important elements of this *chekan* differ greatly from them. The cross sections of its striker and head have a stepped profile (because there are two convex lines along the striker, sleeve, and head) and the lower end of the sleeve has a loop. Finally, on the head of this *chekan*, a feline animal with a semi-round ear, closed mouth, and a long tail with a spiral end is depicted; a jagged line shows teeth in its mouth. The Minusinsk felines are shown with semi-round ears, but their mouths are open; in the early Scythian period, their paws were depicted as rings. Only two *chekans* with similar birds' heads under the striker and with a loop at the lower end of the sleeve are reported from the Kansk region, and one of them also has a stepped striker in the cross section (Radlov, 1894: plate XVI, *10, 11*; Chlenova, 1967. plate 7, *15, 16*). The 7th – 6th century BC Tagar daggers are more massive; the cross sections of their strikers and heads are round or polyhedral, and there are no loops at the lower sleeve end. The *chekans* with loops at the lower sleeve end have been reported from the vicinity of Krasnoyarsk (Radlov, 1894: plates XVI, *13*; XVII, *1*; Zavitukhina, 1983: 103, N 14). We could have proposed that the *chekan* from the Bolshoy Pit River was brought into the Kansk region from the Krasnoyarsk region, except an identical *chekan* was found in the Elekmonar village on the Katun River (Gorny Altai) (Fig. 4, *10*) (Chlenova, 1995: fig. 1). This *chekan* is flat, and there is a wide flat band along its striker and its head; a predatory-bird's head is seen under the striker. Obviously, this *chekan* is older than the *chekan* from the Bolshoy Pit River. It is difficult to say how this *chekan* from the Katun River could have reached the Bolshoy Pit River, a tributary of the Enisei River. There are a lot of possible ways, but they are not indicated by any finds, as in the case of the Korsukovo hoard.

Conclusions

When examining the finds of the Early Scythian type from the East Siberian taiga, the first thing to do is to check the location of gold-bearing rivers near the places of discovery and try to map possible routes to these rivers. In this article, I considered only two examples: the Korsukovo hoard and the Bolshoy Pit *chekan*. Probably, gold was among other reasons that attracted ancient people into the Kansk region. Undoubtedly, more objects of the "Early Scythian" type should be found and they will be found in the near future.

A larger number of the Scythian-type finds attributed to the latter half of the Scythian epoch are reported from the southern borders of the taiga zone. These objects were found in the settlements that yielded ceramics of the southern type (for example, the Tagar set of ceramics from the settlements near Tomsk (Pletneva, 1976: 235; Mets, 2000: 134) and from the burial grounds (ceramics of the Bogochanovo type in the southern Irtysh River basin)). Obviously, these bronze objects found their way into the taiga zone of West Siberia from the Altai through the

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* According to Y.S. Grishin's personal communication, February, 2001.

Bolsherechensk and Sargat cultures (Mogilnikov, 1989: 61; Danchenko, 1996: 103, fig. 55, *18*). There is no gold in these regions.

There are other finds of the Scythian type in the taiga area. We can note some reasons for their appearance: a part of the Tagar population could have been forced to move to the Tomsk taiga, or intercultural contacts became more frequent (as in the case with the Bogochanovo Culture).

I would like to thank Y.S. Grishin for the information on the bronze objects placed in the Eniseisk Museum, which he visited in 1975.

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A SASANIAN SILVER PLATE FROM THE SYNYA RIVER*

Discoveries of oriental silver plates in Russia have occurred mainly in the 19th century, primarily in the Kama basin and the western part of the Urals. In the 20th century, similar plates and other metalwork dating from the 8th – 9th centuries were first recorded from functioning sanctuaries of the Ob Ugrian population in the lower Ob basin (Chernetsov, 1947; Gemuev, 1988; Gemuev, Baulo, 1999; Baulo, 2000; Baulo, Marshak, 2001). The most recent expedition, in the summer of 2001, has been very fruitful, with investigations in two Khantic settlements in the Shuryshkar Region of the Yamal-Nenets Autonomous District yielding three silver plates. The present paper focuses on the most interesting of the three: a Sasanian silver plate.

The present owners of this piece referred the discovery of the plate to the second part of the 19th century. They reported that the great-great-grandmother of the present owner was going by boat along the Synya River from one settlement to another together with her husband, when somewhere in the middle of their trip they landed for a short rest. The woman noticed something glittering in the grass. They dug out the soil and discovered a treasure: several brass cauldrons containing cast silver and bronze animal figurines representing samples of West Siberian cult objects dating from the second part of the 1st millennium AD. The Ob Ugrian people believed that any unusual found object had been "sent from the Heavens," so the new owners incorporated the newly found articles into their set of family ritual objects. The plate under discussion was passed down through the generations from father to younger son. The inheritor was forbidden to see this plate while his father was alive; similarly, the owner's elder brothers are not permitted to see it today. The religious-ritual practice of the Mansi people is characterized by similar restrictions in the handling of sacred silver plates. For instance, V.N. Chernetsov reported that in the 1930s a silver plate "depicting seven persons" was deposited in S. Sampiltalov's family sanctuary wrapped in cloth, and nobody was allowed to see it, even the son of the owner The son would be able to see the plate only upon his father's death (Istochniki..., 1987: 200).

Most recently, the Synya plate has been stored in a house. The right portion of the entrance hall is screened off to form a room where women are not allowed. A wide shelf has been constructed at the rear wall for keeping the family cult objects. A large figurine of Kurpat-iki dressed in black is placed in the left corner of the shelf. The function of this deity is very close to that of the Russian house-spirit – *Domovoi*. To the right of this image is a large linen sack containing family ritual articles: a figurine of a female patron-spirit (god of the master's mother), a sacred blanket portraying seven horsemen, a ritual belt bearing seven bird images (these two objects were made for the master's father, who was a renowned shaman in the Synya basin and ran the largest sanctuary in this region); the silver plate, wrapped in seven shawls, was placed underneath the enumerated objects. Among other things kept on the shelf, there was a male hunting belt with decorative silver pendants, one of which had the shape of a bird representing a sample of the Ural traditional cast objects of the 8th – 10th centuries. The Kurpat-iki figurine, the blanket, the belt, the plate, and the silver bird figurine were inherited by their present owner due to the younger son's right of succession. Such

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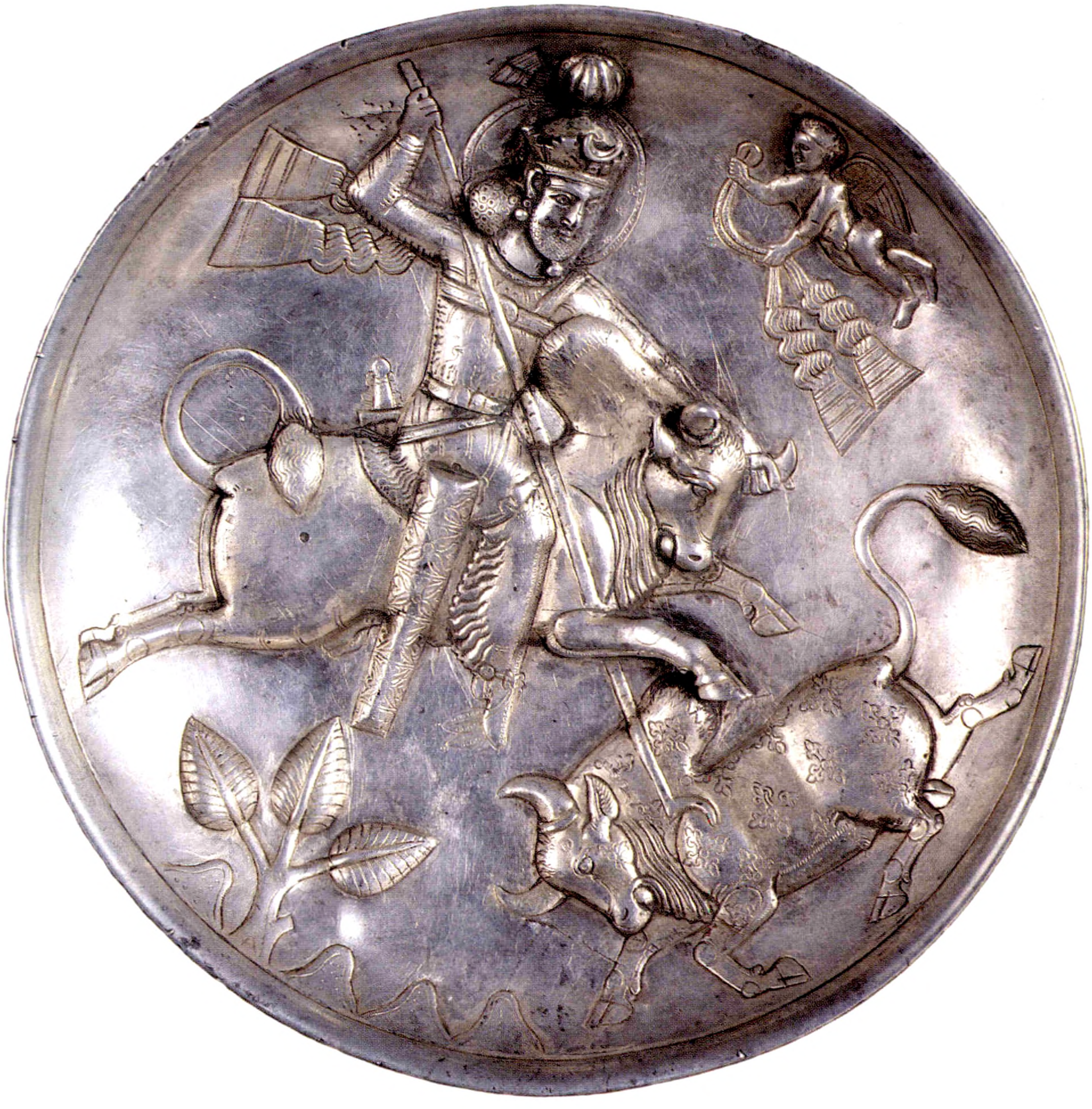

Fig. 1. The Synya Sasanian silver plate.

important things are kept in the entrance hall, because the local tradition forbids keeping things inside a house if they were found in an outdoor hoard. The owner of these sacred objects herds reindeer and used to take all of them (except the mother's patron-spirit) with him when roaming the Polar Urals in his *vanzei,* a special sledge.

In ritual ceremonies, this plate is used as a dish for sacrificial bread, biscuits, and sweets. It is interesting that during the five years that have passed since his father's death, the new owner has never taken the plate out of the shawls and looked at it. The plate still contains some biscuits and banknotes from the last ceremony.

Plate description (Fig. 1). The plate has a low ring-shaped foot, the rims are thicker than the rest of the plate, and the edge is rounded. The diameter of the plate is 22.2 cm; its height is 4.8 cm. The diameter and the height of the foot are 7.5 cm and 1.2 cm respectively. The weight of the plate is 864 g. The technological sequence of production includes the following stages: casting, hammering, chasing, engraving, and gilding (on some portions of the plate the gold coating is missing). The major characters and elements of the interior design are made in a high relief (the king's head, his hair, his crown topped with a globe, his attire, and quiver, as well as

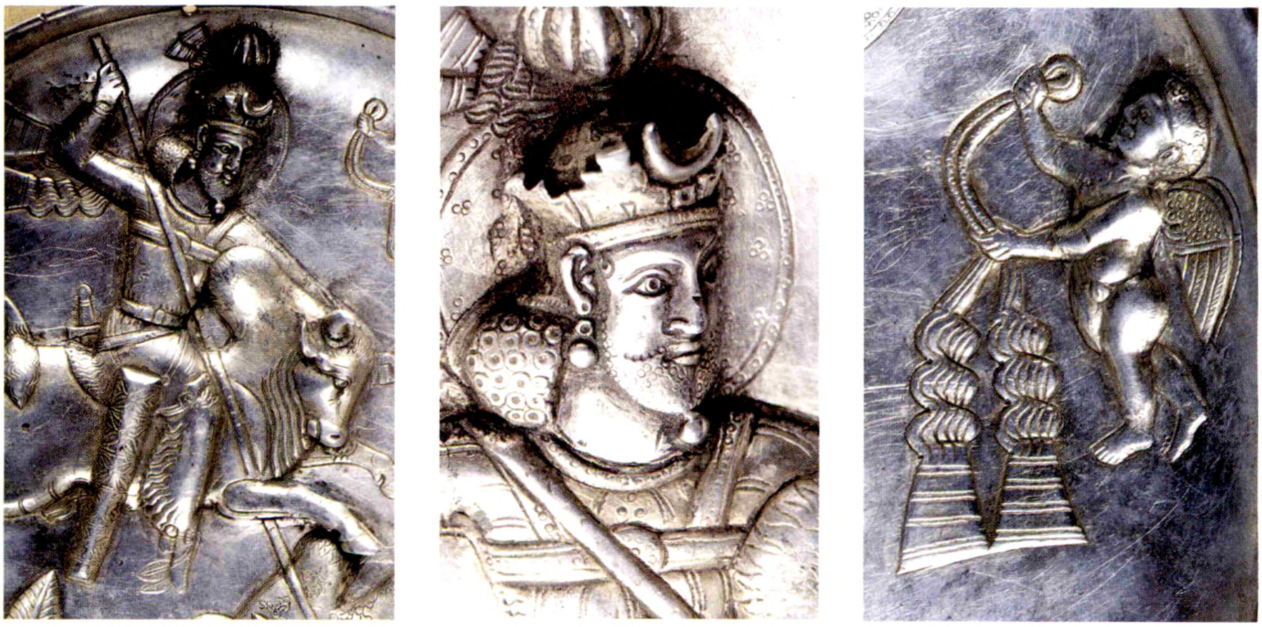

Fig. 2. Close shots of the images.
a – king's figure; *b* – king's head; *c* – winged "genius".

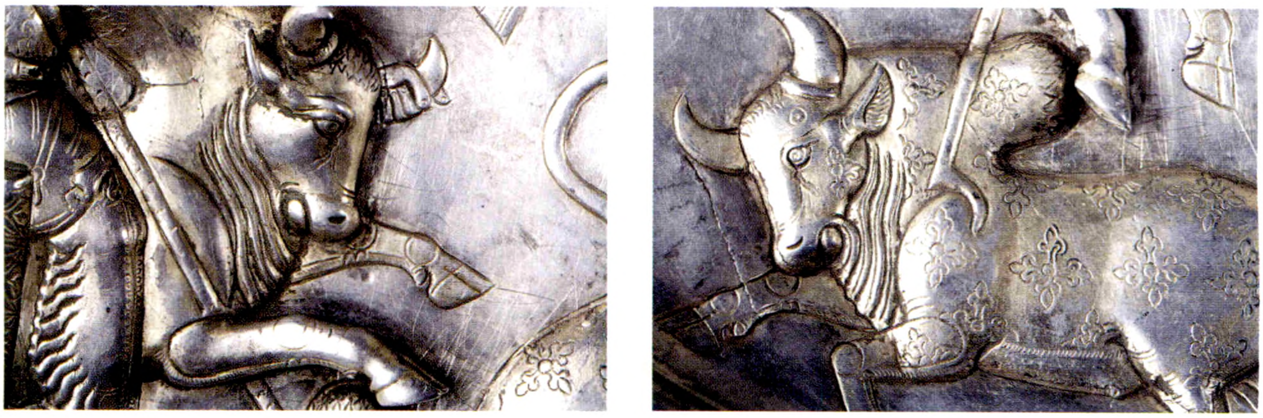

Fig. 3. Close shots of the animal figures
a – the figure of the upper bull; *b* – the figure of the lower bull.

certain parts of the bulls' bodies, excluding the upper bull's tail, its left foreleg and rear legs, its left horn; the body of the lower bull is in high relief, excluding its legs, tail, and its right horn; also in high relief are the figure of the winged boy and the leaves of the bush).

The king is depicted sitting on a zebu bull "flying" at a gallop. His left hand is holding the bull's horn, and his right hand is striking another bull, which occupies the lower part of the plate (Fig. 2, *a*). The king's head is shown in three-quarter view (Fig. 2, *b*); the body is shown in frontal view; the legs are shown in side view. There is a halo encircling the king's head. The king wears a beaded diadem with streamers and a crown with a central crescent surmounted by a vertically striated globe (P.O. Harper thinks that such a form might have represented a flower bud (Harper, Meyers, 1981: 61)). The streamers flutter to the figure's left from the crown globe and from the hoop on the king's neck. Both the diadem and the hoop are beaded. The king wears a massive rounded earring in his right ear. His curled hair is pulled together in a ball at the back of the head. The king's beard is dressed with a ring at its tip. He wears a long-sleeved tunic and full trousers gathered at the calf, tied up with a ribbon and decorated with a buckle. The drapery on the tunic and the full trousers suggests a thin, fold-forming cloth. The full trousers form especially rich drapery Over the tunic belted at the waist with two buckles there is a beaded halter. The toe of some soft shoe is stretched out. Fingernails are shown on the left hand. The circle representing the fingernail of the forefinger is also depicted, though it would not be seen if the hand were in such a position. A sword is attached to the belt at the king's back, only its hilt is shown above the horse's back. A quiver suspended from the king's belt is divided into six sections, five of which are decorated with a beaded flower motif and the sixth with pearl-like ornamentation

The upper bull's thigh has a rounded hollow, which was probably left by some missing decorative element The lower bull is shown in death agony, its head lowering lifelessly, though the tail has not yet fallen down. There is a dot in a circle placed above the left eye The figure of this animal is decorated with an ornamental motif in the form of a sophisticated stylized cross (Fig. 3). The tassels at the tips of both bulls' tails are shown with the aid of longitudinal wavy lines. The animals' leg joints are accentuated with circles. The genitals are depicted

The upper right portion of the plate is occupied by the figure of a bare, winged young boy ("genius") carrying streamers to the king (see Fig. 2, *c*). The lower central part of the plate shows a mountain range and a bush with three leaves.

The plate also exhibits traces of later engravings. For instance, a long figure portraying a bird bearing a "life line" motif was incised above the sword hilt and a pair of deer was depicted to the left of the "genius." A Siberian (or Uralian) craftsman might not have chosen this place for depicting the deer at random, because the streamers in the boy's hands may have been perceived as lassos

The exterior of the plate shows a five-point star at the center of the ring-shaped foot. Outside the circle is the inscription *jâ-m i fizzah,* meaning "a silver bowl." Such Arabic italics were used in the 9th – 10th centuries. The phrase was written in the New Persian language by order of one of the last Central Asian or Iranian owners of this plate (the phrase has been interpreted by B.I Marshak). Consequently, the plate could not have arrived in Siberia prior to the 9th century.

Let us describe the royal figure. It is most probably a portrayal of Yazdgard I, Shah of Iran (399 – 421). He reigned during a difficult time for Iran, when the royalty struggled against prominent landowners. The shah decided to rely upon Christians as his allies. Christians were given the right to build churches, to move freely around the country, and to perform their religious services. The shah sought a peaceful relationship with Byzantium and perceived the Iranian Christians as a link between the two countries. As a result of his policy, Yazdgard I was glorified as a fair king in Christian literature, while the Sasanian tradition treated him as a "sinner." Toward the end of his reign, Yazdgard I changed his attitude towards Christians and undertook certain repressions against them. The shah's death occurred under a veil of secrecy as he was traveling in the northeastern province of his country. Legend holds that an unusually beautiful steed rushed out of a spring. The steed was wild, nobody could have approached it. The steed kicked the shah's breast, striking him to death The assumption has been debated in literature (T. Neldeke) that the nobility invented this legend in order to conceal the fact that they had murdered the shah. (Diakonov, 1961: 272 – 273).

The contemporary Sasanian coins portrayed Yazdgard I in a crown centered with a crescent and surmounted by a globe (Sasanian Silver ..., 1967: 158, N 82, *l*). The plate under discussion shows a similar type of crown. However, no known Sasanian coins show the crown with a vertically striated globe. Such a motif rarely occurs on plates as well. A. Gunter and P. Jett have reported only four examples· two plates in the Freer Gallery (portraying Shapur II, and, according to their identification, Peroz or Kavad I), one plate in the Metropolitan Museum, and one in the Hermitage Museum, St. Petersburg (portraying Yazdgard I and Varakhran, "King of the Kushanians," respectively) (Gunter, Jett, 1992: 108). Certain researchers have interpreted the occurrence of this striated globe in the crown ornamentation on the Kushanian-Sasanian coins as a symbol of Sasanian kings' ownership of the Kushanian territories (Harper, Meyers, 1981: 61). Others have insisted upon a Sasanian origin of this symbolic globe and its consequent reproduction in Kushanian-Sasanian art. E. Herzfeld suggested that the striated globe formed part of the shah's battle dress, a feature of royal headgear associated with war helmets rather than crowns (Gunter, Jett, 1992: 108).

Let us compare the plate from the Metropolitan Museum portraying Yazdgard I killing a deer (Harper, Meyers, 1981: Cat. 16) with the plate found in the Synya basin. They demonstrate a certain similarity. Both plates are roughly the same size (22 2 cm and 23.4 cm respectively). Both articles exhibit details made in high relief and demonstrate a similar design of the crowns, beard and hair dress, as well as a similar way of showing the streamers descending below the toes of the footwear. Both plates show a similar design of the halo (a three-circle pattern inside the halo, its edge is worked out with pecking). The halo encircling the shah's head represents a feature that has been perceived as a symbol of the "Keianidian Khvarena" (God of Happiness). Starting from the 4th century, the Sasanian kings linked their origin to the ancient "godly" dynasty of the Keianidians (Trever, Lukonin, 1987: 57).

Both plates show Yazdgard armed with an unusual type of spear. Harper defined the form of this spearhead as crescent-shaped (Harper, Meyers, 1981: 63). However, judging from the Synya plate, the spear rather resembles a bident: a standard straight spearhead is plunged into the bull's body, while the second crescent-shaped tip of the spearhead serves as a restraint, helping the king to easily withdraw his spear from the animal's body. Another purpose of this second crescent-shaped tip may be for picking up prey and carrying it (though applicable for smaller animals than the bull). In any case, this weapon seems to be regarded to as a hunting device rather than a military one.

Certain dissimilarities have also been noted between these two plates· the Metropolitan Museum specimen shows Yazdgard's hair on both sides of his head; his beard is not tied up, and the spear handle exhibits a different form. The Synya plate displays no streamers fluttering from the king's diadem (instead, the "genius" is carrying such streamers); the strips of beaded halter and buckles have not been shown, the bold figures are made using continuous plates (not fragmented).

In any case, the discovery of the plate in the Synya basin has been very important in attesting to the authenticity of the Metropolitan Museum plate portraying Yazdgard I. The Metropolitan Museum plate has been purchased recently, and the fact that the art market is full of counterfeit Sasanian silverware made V.G. Lukonin doubt its authenticity (Trever, Lukonin, 1987: 41). The noted coincidences in exceptionally rare features of ornamentation, like the crescent-shaped spearhead and the specific design of the lower bull and deer's bodies, prove the authenticity of the Metropolitan Museum specimen.

Comparisons of the Synya plate with the silver dish from the Freer Gallery showing Shapur II hunting wild boars (Smirnov, 1909: N 57; Gunter, Jett, 1992: plate 13) also present considerable interest. Both articles are roughly the same size and weight. Both demonstrate concurrent details: a "flying" gallop of the animals; similar ways of positioning the animals' legs (similar poses of racing animals and those of quarry), the use of circles in depicting joints; the flower motif decorating the upper register of Shapur's quiver and a similar motif in five registers of Yazdgard's quiver; the positioning of swords and hanging straps; handles and pommels of the swords (a globe and two transversal lines); the forms of the quivers; the ornamentation of the horses' harness tassels and the bulls' tails with wavy lines. The analysis shows that all the three plates discussed here were manufactured by artisans of one and the same school, or even in one studio at roughly the same time.

The art of modeling in high continuous relief is known to be a feature of the royal, or central, school of ancient Iranian metalwork. Such a technique is characterized by a non-detailed elaboration of images, thorough working, considerable weight, and standard dimensions. The earliest known examples include the Cleveland Museum's Hormizid II (?) plate and the British Museum's Shapur plate. Both date from the 4th century (Trever, Lukonin, 1987: 55). If we consider the Cleveland plate to be a later replica, then the Teheran Archaeological Museum's plate (4th century) seems to be the earliest known plate with a standard composition of a royal lion-hunting scene (Ibid.: 54, 56, 57). As early as the first decade of the 4th century, the shah of Iran became the hero of hunting scenes. The Teheran plate shows features that later became standard: large superimposed plates that form the high relief of the figures, animal leg joints shown using small circles, a mountain motif, a horse "flying" at a gallop, the king's tied up beard. The plate discussed in this paper displays all these characteristic details. The image of the "genius" also represents an early feature of Sasanian art. For instance, the Bishapur rock relief, which was identified as a collective portrait of Shapur I and Roman emperors, shows a bare boy flying down to the king bearing the streamers of power (on the Synya plate, the boy's pose and the way he bears the streamers is similar to the Bishapur image). V.G. Lukonin regarded this image as "a true Roman-style figure of a flying genius with a wreath of Victory... Certain features had been canonized by that time: the position of the leg with the stretched-out toe, the beard coming through a ring... From that time on, the representation of the drapery of the king's loose trousers became standard" (Lukonin, 1977: 182, 185).

One more example of a royal hunting plate is the smaller Freer Gallery plate depicting a shah chasing ibexes and gazelles (Gunter, Jett, 1992: plate 14). Features of the shah's headgear allow his identification as Peroz or Kavad I. Gunter and Jett have highlighted the specific leaf-shaped streamers suspended from the shoes, the same streamers that decorate Yazdgard's attire on the Metropolitan plate (Ibid.: 115) and on the newly discovered Synya specimen. The latter demonstrates the following features in common with the small Freer plate: the shape of the quiver, the striated globe on the crown, the ornamentation pattern of the tassel suspended from the saddle (a similar pattern occurs in the ornamentation of the tassels on the bulls' tails). In fact, the crown itself on the Freer Gallery plate is similar to that of the Synya Yazdgard's headgear. Marshak expressed his opinion in personal communication with the present author that the noted similarity in details of the headgear may suggest that Yazdgard himself is depicted on the Freer Gallery plate (which means that the plate was manufactured early in the 5th century). I tend to agree with the proposed attribution.

The Synya plate demonstrates certain iconographic features traditional for Sasanian art. A scene portraying a king hunting a zebu bull is recorded from a plate of one private collection in the USA. Some researchers have dated it to the 5th century (Marschak, 1986: 428); others have referred it to the 6th – 7th centuries (Harper, 1978: 58). Marshak has also attracted my attention to the fact that a three-leaf bush and a zebu bull image are featured on an Iranian silver rhyton of the 4th century (?) shaped as an antelope's head (The Arthur M. Sackler Collection) (Ibid.: 36 – 37).

The meaning of the royal hunting scenes deserves special discussion. Sasanian metalwork often depicts live and killed animals in one composition (Trever, Lukonin, 1987: 55). The Synya plate scene features a king sitting on the back of one bull while striking another with his spear. Such a scene may assume various interpretations. Firstly, the composition may be interpreted as an ordinary hunting scene demonstrating the exceptional skill of the king, having mounted one bull and striking another. The king holds the spear with one hand, not with two (as, for instance, on the plate from the Emir of Badahshan's collection (Harper, Meyers, 1981: 55, plate 11)), because he is holding the bull's horn with his other hand in order to balance himself. Moreover, the scene may be interpreted as the fight of the shah against two bulls (in imitation of Roman circus fights) rather than a simple hunt. With this combat, the king is asserting his right to ascend the throne and obtain the symbols of his royal rank from the gods. Such an interpretation rests on the special form of the spear with two tips, adapted to arena fighting. In such case, the cross pattern occurring on the body of the lower bull becomes more clear* (a ceremonial animal in a blanket?). Yazdgard I seems to have had a predilection for extraordinary animals, a passion that would have been known to the Iranian people. In such a case, it is not surprising that the legend disclosing the circumstances of his death involves a miraculous steed. The death of the king "while hunting" would have seemed plausible for his people.

Secondly, in accord with Lukonin's point of view, the scene may be interpreted in terms of Zoroastrian symbolism. The royal hunting scene features the high godlike values of the king of kings. Fighting with an animal was aimed at the acquisition of its merits. The Avesta texts narrate struggles for the acquisition of certain divine merits personified in different animals: strength, invincibility, good luck, etc. In order to acquire these features it was necessary to catch the animal personification of a god. Lukonin interpreted the hunting scene on the Sar-i Meshhed rock relief as Varakhran II's attainment of royal merit through killing a lion. The Shapur II plate from Freer may be interpreted as a fight for acquiring the role and values of Vretragna, the god of war and victory (Trever, Lukonin, 1987: 56, 57, 59). The zebu bull has been known to be a personification of the "primeval bull," a Zoroastrian deity (Lukonin, 1977: 209). The Synya plate may have depicted the shah's fight for the acquisition of the merits of this mythological character.

Another idea may be linked to the Zoroastrian theme. The second Yazdgard plate shows a very unusual deer Its body displays a specific ornamentation pattern consisting of flowers of two different sizes. The deer itself is of the same height as the shah, its antlers being at the same level with that of the shah's crown. This may highlight the equality of the shah's merits with the value and strength of the deity personified in the image of an animal.

Thirdly, K.V. Trever's opinion about the royal hunting scenes should also be noted. She believed that the shah himself had ordered many such plates. When the shah ordered the depiction of himself fighting with animals, he required his image to be godlike (as in the scene of Mitra killing the primeval bull), struggling for good and light against evil and dark. So the hunting scene may symbolize the dualistic ideological system of Zoroastrianism (Trever, 1939: 247 – 249). The Synya hunting scene showing the shah mounting one bull while striking another resembles the Mitra scene. The British Museum plate depicting Shapur II mounting a deer represents the unique composition in Iranian toreutics. Analogous composition on a stucco panel has been reported from Chal Tarkhan (dating from the second half of the 7th – first half of the 8th centuries). The plate depicts a male deity with a shining halo encircling his head on the back of a deer (Harper, 1978: 116). O. Grabar argued that such compositions might be suggestive of a legend about existing sacrifices analogous to the Mitra theme (Sasanian Silver..., 1967: 54 – 55). In such a way, the Synya plate scene may also be interpreted as the sacrifice of a bull. Consequently, the shah might have been perceived as a personification of Mitra.

In sum, this article is focused on the discovery of the first Iranian plate of the Sasanian period found in West Siberia. Prior to the Synya plate, only a paten (*discos*) plate depicting angels surrounding the cross was reported from this region. The *discos*-plate was manufactured by Syrians of the Nestorian Christian sect who populated Mesopotamia in the 6th century, the territory which belonged to Iran at that time (Sokrovisha Priobia, 1996: N 25). The Synya plate depicting Yazdgard I and two bulls can be counted among the most brilliant examples of classical Sasanian art. I am sure that the history and interpretation of the enigmas surrounding this artifact will be the focus of research for forthcoming generations

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DENTAL FEATURES OF THE EARLY NOMADS IN GORNY ALTAI

Introduction

Ethnocultural differentiation of the Gorny Altai populations in the Scythian period has recently become more topical than it was before due to the intensification of archaeological studies. The discovery in Gorny Altai of several new groups of Early Iron Age sites has made it possible to identify different cultural traditions within this period.

One of the distinct cultures, so far unnamed, is represented by 8th (or late 9th) – early 6th centuries BC sites (Mogilnikov, 1986; Stepanova, 1986; Kiryushin, Tishkin, 1997). Sites dating from the subsequent chronological stage (late 6th – early 2nd centuries BC) are attributed to the Pazyryk Culture. Based on several sites synchronous to the latter but differing by certain features of the funerary rite, the Kara-Koba Culture was delineated (Surazakov, 1983; Mogilnikov, 1983). A group of sites, few in number so far, and differing from both the Pazyryk and the Kara-Koba sites, was described as Chumysh-Isha and is believed to represent a distinct cultural tradition (Surazakov, 1988).

The archaeological differentiation within the early nomadic sites in Gorny Altai, then, is an open question and may only be resolved on the basis of new data which would clarify both cultural and biological differentiation processes in the region In this respect, biological features are no less important than are funerary rite, ceramics and other grave goods, and other cultural criteria.

Biologically, until the most recent decade, early Gorny Altaic nomads were probably the least known among the populations of the Scytho-Siberian world. The amount of skeletal materials, however, has been gradually increasing. Most interested specialists are quite familiar with the assessment of biological characteristics of the Pazyryk people given by G.F. Debetz (1948), S.I. Rudenko (1953, 1960), and V.P. Alekseev (1958, 1975, 1986) based on skeletons from the first Scythian-period burial mounds excavated in the Altai. V.A. Dremov (1990) has published more data concerning people buried in the mounds belonging to the Pazyryk and Kara-Koba types. S.S. Tur (1997) has studied a small series of crania (three male, four female, and some fragments) representing the early Scythian stage in Gorny Altai. In this journal, I have published and analyzed a large cranial series from the Pazyryk burials (Chikisheva, 2000). The present publication addresses the dental features of this sample, thus supplementing the results of craniometric analysis. Data concerning a small dental sample from early Scythian-period Kara-Koba burials in Gorny Altai is published as well. The Pazyryk materials are subdivided according to the principal river valleys of that territory (the Ulandryk, the Yustyd, the Barburgazy, the Buguzun, the Middle Chuya, and the Middle Katun), and the Ukok Plateau.

Methods

Due to the poor preservation of teeth (heavy wear of crowns in adults, postmortem scaling-off of enamel, loss of isolated teeth during transportation and storage, and archaeologists' failure to collect the entire dental material), it was practically impossible to measure teeth or to score the descriptive traits in a way other than the simple presence/absence scheme. Patterns and elements of dental relief were scored using techniques elaborated by A.A. Zubov (Zubov, 1968; Zubov, Khaldeyeva, 1993). I focused on the most diagnostic traits, those revealing an east-to-west gradient of variation. Their frequencies in the Pazyryk series were compared with their world distribution, according to Zubov (1973), Zubov and Khaldeyeva (1989), and Scott and Turner (1997).

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Dental features of the early nomads of Gorny Altai: A comparative assessment

Displacement of teeth from the normal line of the alveolar arch, including general crowding, I^2 crowding, and I^1 winging. In his first manual, Zubov (1968) considered all types of crowding, that is, the displacement of any tooth relative to its normal position in the alveolar arch. However, because this trait revealed no ethnic or geographical regularities, eventually only the lingual shift of upper lateral incisors was used in population studies (Zubov, 1973). On the world scale (Zubov, Khaldeyeva, 1989, 1993), its frequencies range from 0 to 50%. In Eurasia, the highest incidence is observed in two regions· the Far East (populations of the Maritime Region (Primorye) and Sakhalin, and those revealing the so-called Arctic combination of anthropometric traits), and eastern Central Asia (Tuvinians, Khakasians, Kazakhs, Nenets, Selkups, and Tatars of West Siberia). In Caucasoids, the occurrence of I^2 crowding is minimal.

Turner has studied the world distribution of another trait, also caused by lack of free space in the alveolar arch: I^1 winging. Its moderate and high frequencies (15 – 50%) are observed in prehistoric and recent populations of Japan, modern peoples of Southeast Asia, China, and Siberia, and Indians of North and South America. The lowest frequencies are displayed by populations of West Eurasia, Africa, and Oceania (Scott, Turner, 1997).

I have not found a single case of I^1 winging in the Pazyryk sample. I have also studied the general crowding of maxillary and mandibulary teeth, and I^2 crowding. In the pooled sample, the occurrence of general crowding is 19.2% (males, 24%, females, 14%) (Table 1). Among the local groups, it is most frequent in Ukok, and least frequent in Yustyd (Table 2). In the pooled sample from central Gorny Altai, females exhibit a much lower frequency than males do. In the male population from Barburgazy and Buguzun, it occurs in 19.2%, and in the female group, it does not occur at all. In Kara-Koba, the percentage of individuals with general crowding is very high. I^2 crowding is very rare in the pooled Pazyryk sample (3.4%), and all these cases concern local groups with the highest frequency of total crowding: Ukok and Kara-Koba.

Diastema between both I^1 (gap wider than 1 mm). According to Zubov and Khaldeyeva (1989, 1993), high frequencies (usually above 10%) are typical of three population groups: Caucasoids, West Siberians (Ob Ugrians, Selkups, Tatars, and Nenets), and Central Siberians (Khakasians, Tuvinians, Buriats, and Evenki). In the pooled Pazyryk group, the percentage is 5.9% (see Table 1), and the trait only occurs in Ukok and Yustyd (see Table 2). In the Kara-Koba sample, it is more frequent (20% on average), but only in males (see Table 2).

Torus palatinus and torus mandibularis. In Zubov's opinion, neither of these tori is associated with any major geographical population group (Zubov, 1973). In certain areas, though, each trait shows increased frequencies (see (Zubov, 1973; Gerasimova, Vasilyev 1998) for world distribution summary). Palatine torus occurs in more than 40% of Pacific coast Eurasians (Eskimos, Aleuts, Yukaghirs, modern and Neolithic Japanese, and Neolithic Koreans); and its frequencies are 20 – 40% and higher in many Eurasian Mongoloid populations. Mandibular torus is very common (66 – 68%) in medieval Norse. Both traits, then, can have some value for establishing population affinities and should be used in comparative analysis.

The palatine torus is quite common in all Pazyryk local samples, both male and female. The incidence of the mandibular torus is moderate, like in most Mongoloid groups. It is more common in males (47.1%) than in females (20.7%). In local populations, its occurrence fluctuates from high or very high (90% in the Ukok males, 54.5% in Yustyd) to minimal in Kara-Koba and Ulandryk (see Table 2).

Hypodonty (congenital absence of teeth). The most likely teeth to be congenitally absent in modern man are third molars, lateral incisors, and second premolars in the maxilla; and third molars, medial incisors, and first premolars in the mandible. Congenital absence of the third molar is typical of both Mongoloids (above 30%) and Caucasoids (20 – 25%) (Zubov, 1973: 83 – 84, table 9). Curiously, Hungarians show a very high frequency (49%) (Ibid.: 83). In the pooled Pazyryk series studied by me, not a single case of incisor or premolar hypodonty was observed, but third molars are often absent (39.1%), females display a higher frequency (45%) compared to males (34%). The occurrence is maximal in Ulandryk and Yustyd, whereas populations of the Ukok and central Gorny Altai (the Chuya, Ursul, and the Middle Katun) show frequencies that are close to those typical of Caucasoids. In Kara-Koba, hypodonty was not registered at all (see Table 2).

Medial incisor (I^1) shoveling is the most informative dental trait at the world level. In Caucasoid populations, its frequency is normally below 15%. Maximal incidence (above 70%) is observed in populations of the North Pacific Asian coast, from the Arctic to Japan, as well as in Mongols, Buriats, Chinese, and Indians of both North and South America. In South Siberia and Kazakhstan, medial incisor shoveling occurs in 40 – 60% of the population (Zubov, 1973). Its frequency in the pooled Pazyryk series is 38.2%, much higher in females (50%) than in males (12 5%; see Table 1). The high overall frequency is largely due to populations from the Yustyd (both sexes), Ukok (females), and central Gorny Altai (females and children). In Ukok males, just one case was observed. In other local groups, the trait is absent (see Table 2)

Carabelli cusp. According to Zubov (1973) and Zubov and Khaldeyeva (1989), this cusp on M^1 is rather common (above 50%) in Caucasoids, especially in northern Europeans. In southern Caucasoids the frequencies are below 15 – 20%. In Mongoloids, the Carabelli trait is rather rare in Northeastern Pacific populations (below 20%, and even below 10% in Eskimos, people of southern Primorye, China, Japan). In Buriats, it occurs in less than 5% of the population. The frequency is within 20 – 30% in eastern Central Asia (Mongols and Tuvinians), South Siberia (Khakasians), and West Siberia (Ob Ugrians, Tatars, and Nenets; Selkups with 15% are an exception). In Kazakhs, the Carabelli cusp is considerably more common (ca 50%).

In the pooled Pazyryk sample, the frequency is 10.2%, females showing a higher occurrence than males (10 versus 4.8%). Virtually the same frequencies are observed on the second upper molars of the Pazyryk people. In the Kara-Koba group, not a single case was registered.

Hypocone reduction on M^1 (4-) and M^2 (3 and 3+) I am unaware of any comparable data concerning the first molar, but the presence of this trait in the Pazyryk series is probably worth mentioning. Its frequency in the pooled sample is rather low (7.8%), attaining maximum in females of the Ukok and in children of the Yustyd and central Gorny Altai.

Hypocone reduction on the second molar, according to the world distribution tables (Zubov, Khaldeyeva, 1993), ranges within very wide limits (13 – 95%). Scott and Turner (1997) give a much narrower range (0 – 35%), but they only scored the true three-cusped condition (grade 3) without taking into account grade 3+. When Zubov and Khaldeyeva's scoring technique is used, no association with major geographical subdivisions of mankind is seen; however, the wide range of variation, as they claim, justifies the use of this trait in local population comparisons (Zubov, Khaldeyeva, 1993). When, however, only true three-cusped molars are taken into consideration, certain geographical regularities can be discerned. Specifically, maximal frequencies (20 – 35%) are displayed by Europeans, peoples of India, Siberian Mongoloids, and native Arctic Americans, whereas minimal occurrence (0 – 10%) is typical of South Pacific populations and southern Africans; Sundadont Mongoloids of Southeast Asia, Melanesians, and American Indians being intermediate (Scott, Turner, 1997).

The frequency of reduced upper second molars (grades 3+ and 3 pooled) in the Pazyryk group is moderate (40.9% in the pooled sample without appreciable local variation in either males or females, see Table 1). In Yustyd, Barburgazy, and Buguzan, the trait is less common than in other Pazyryk groups. Its maximal incidence is seen in Kara-Koba (see Table 2).

Enamel extension (4-6) on M^1 and M^2 is the most typical of Mongoloids and is very diagnostic for establishing high-level population affinities. Zubov scores it on the second molar, even though he admits that it is preferable to score discrete dental traits on the first molars, since these are more stable (Zubov, Khaldeyeva, 1993). Turner does indeed score it on the upper first molar. While his scale differs from Zubov's, both are comparable since Turner's grades 1 – 3 roughly correspond to Zubov's grades 4 – 6 (Ibid.). According to Zubov, the world distribution range of the enamel extension is very wide (0 – 70%). Low frequencies (0 – 10%) are characteristic of Caucasoids and African Blacks appear to lack the trait altogether. The highest occurrence (above 60%) was observed in continental and Pacific North Asian Mongoloids (Zubov, 1968; Zubov, Khaldeyeva, 1993). According to Scott and Turner (1997), enamel extension on the first molar is rare (0 – 10%) in West Europeans, African Blacks, South Pacific populations, and the Jomon people; moderate frequencies (20 – 30%) were registered in Sundadont Mongoloids and South Siberians, and the highest occurrence (40 – 60%) is revealed by Mongoloids of East and North Asia and by American Indians.

In the pooled Pazyryk series, the frequency of enamel extension on the first molar is extremely low (less than 10%; see Table 1). It is somewhat more frequent in Ukok, especially in males, and in the pooled group from central Gorny Altai (see Table 2). The trait is much more common on the second molar (35% in the pooled Pazyryk sample), the highest frequency (above 60%) being seen in the central Gorny Altai group (see Tables 1, 2). In the Kara-Koba series, it was not found either on the first or on the second molar (see Table 2)

Number of cusps on lower molars ($M_1 6$, $M_1 4$, $M_2 5$, and $M_2 4$) According to the world distribution tables (Zubov, Khaldeyeva, 1989, 1993), the six-cusped first molar is rather diagnostic for high-level differentiation because of being associated with groups representing the "Eastern dental complex." The highest frequencies, though, were observed in Australian natives (52.5%) and Polynesians (52%); ranging from 30 to 50% in Mongoloids of North and East Asia and American Indians (Scott, Turner, 1997). In Caucasoids and hybrid populations of West Siberia speaking Finno-Ugric and Samoyed languages, the trait occurs in less than 10%.

Table 1. Dental characteristics of the pooled Pazyryk sample from Gorny Altai

Side	I^1 shoveling	I^2 shoveling	Accessory cusp on M^1	Carabelli cusp on M^1	Carabelli cusp on M^2	Hypocone reduction (4-) on M^1	Hypocone reduction (3, 3+) on M^2	Enamel extention (4-6) on M^1	Enamel extention (4-6) on M^2	6 M_1	4M_1	4M_2	5M_2
							Males						
Right	1(11)/9 1	10(11)/90 9	0(26)/0	0(24)/0	1(27)/3 7	0(24)/0	11(26)/42 3	3(32)/9 4	10(30)/33 3	1(28)/3 6	10(29)/34 5	27(30)/90	2(29)/6 9
Left	1(11)/9 1	11(15)/73 3	0(31)/0	1(27)/3 7	1(26)/3 8	0(26)/0	10(24)/41 7	2(32)/6.2	8(29)/27 6	1(25)/4	7(26)/26 9	27(33)/81 8	4(32)/12 5
Right + left	2(22)/9 1	21(26)/80 8	0(57)/0	1(51)/1 9	2(53)/3.8	0(50)/0	21(50)/42	5(64)/7.8	18(59)/30 5	2(53)/3 8	17(55)/30 9	54(66)/81 8	6(61)/9 8
Individuals	2(16)/12 5	14(19)/73 7	0(23)/0	1(21)/4.8	1(22)/4.5	0(27)/0	12(28)/42 8	3(35)/8 6	11(28)/39 3	1(22)/4 5	10(26)/38 5	26(30)/86 7	4(31)/12 9
							Females						
Right	4(6)/66 7	8(10)/80	0(34)/0	3(34)/8 8	2(26)/7 7	1(37)/2.7	11(29)/37 9	4(42)/9 5	10(30)/33 3	0(38)/0	6(38)/15 8	33(39)/84 6	5(39)/12 8
Left	4(8)/50	12(17)/70 6	0(33)/0	2(33)/6 1	1(28)/3 6	1(35)/2.9	10(27)/37	2(38)/5 3	7(29)/24 1	0(35)/0	7(35)/20	30(37)/81 8	5(37)/13.5
Right + left	8(14)/57 1	20(27)/74 1	0(67)/0	5(67)/7 5	3(54)/5 5	2(72)/2 8	21(56)/37 5	6(80)/7 5	17(59)/28 8	0(73)/0	13(73)/17.8	63(76)/82.9	10(76)/13 1
Individuals	6(12)/50	14(18)/77 8	0(30)/0	3(30)/10	3(28)/10 7	1(37)/2 7	14(36)/38 9	4(43)/9 3	10(27)/37	0(31)/0	8(31)/25 8	35(40)/87 5	7(41)/17 1
							Total + children						
Right	10(23)/43 5	21(24)/87 5	1(68)/1 5	5(65)/7 7	4(55)/7 3	4(71)/5 6	24(57)/42 1	7(76)/9.2	20(62)/32 2	1(73)/1 4	16(74)/21 6	61(71)/85.9	8(70)/11 4
Left	7(21)/33 3	26(38)/68 4	0(71)/0	6(61)/9 8	2(55)/3 6	4(70)/5 7	20(52)/38 5	4(72)/5 6	15(59)/25 4	1(66)/1 5	14(67)/20 9	59(73)/80 8	10(72)/13 9
Right + left	17(44)/38 6	47(62)/75.8	1(139)/0 7	11(126)/8 7	6(110)/5 4	8(141)/5.7	44(109)/40 4	11(148)/7 4	35(121)/28.9	2(139)/1 4	30(141)/21 3	120(144)/83 3	18(142)/12 7
Individuals	13(34)/38 2	35(44)/79 5	1(62)/1 6	6(59)/10 2	4(51)/7 8	5(74)/6 8	27(66)/40 9	7(88)/7 9	21(59)/35 6	1(62)/1 6	19(66)/28 8	65(76)/85 5	12(78)/15 4

Table 1 (continued)

Side	$5M_{1+}$	XM1(4-6)	YM_2	$3YM_2$	M_{2+}	XM_2	Distal trigonid crest on M_1	Deflecting wrinkle on M_1	Three-rooted M_1	Diastema	General crowding	I^2 crowding	Hypodonty	Torus palatinus	Torus mandibulans
Right	3(25)/12	2(23)/8 7	5(31)/16.1	2(31)/6 4	12(31)/38.7	14(31)/45 2	0(23)/0	0(8)/0	1(32)/3 1	–	–	–	–	–	–
Left	6(20)/30	3(23)/13	9(33)/27 3	1(33)/3	13(33)/39 4	12(33)/36 4	0(24)/0	0(11)/0	0(32)/0	–	–	–	–	–	–
Right + left	9(45)/20	5(46)/10 9	14(64)/21 9	3(64)/4 7	25(64)/39 1	26(64)/40 6	0(47)/0	0(19)/0	1(64)/0	–	–	–	–	–	–
Individuals	6(20)/30	2(18)/11 1	6(26)/23 1	2(28)/7 1	18(31)/58 1	15(30)/50	0(20)/0	0(9)/0	1(26)/3 8	2(23)/8 7	6(25)/24	1(26)/3 8	16(47)/34	35(48)/72 9	24(51)/47 1
Right	7(35)/20	2(35)/5 7	5(39)/12 8	0(39)/0	20(38)/52 6	13(38)/34 2	1(31)/3 2	0(25)/0	1(36)/2 7	–	–	–	–	–	–
Left	4(33)/12 1	4(33)/12 1	3(37)8 1	0(37)/0	19(36)/52 8	16(36)/44 4	0(31)/0	0(24)/0	1(34)/2 9	–	–	–	–	–	–
Right + left	11(68)/16 2	6(68)/8 8	8(76)/10 5	0(76)/0	39(74)/52 7	29(74)/39 2	1(62)/1 6	0(49)/0	2(70)/2 8	–	–	–	–	–	–
Individuals	9(28)/32 1	2(28)/7 1	8(33)/24 2	0(36)/0	19(38)/50	22(38)/57 9	1(28)/3 6	0(20)/0	1(36)/2 8	1(28)/3 6	4(27)/14 8	1(30)/3.3	18(40)/45	32(50)/64	11(53)/20 7
Right	12(67)/17 9	6(65)/9 2	10(72)/13 9	2(72)/2 8	32(71)/45.1	29(71)/40 8	1(61)/1 6	0(40)/0	2(71)/2 8	–	–	–	–	–	–
Left	11(59)/18 6	10(62)/16.1	12(73)/16 4	1(73)/1 4	34(72)/47 2	30(72)/41 7	1(62)/1 6	0(41)/0	1(68)/1 5	–	–	–	–	–	–
Right + left	23(126)/18 2	16(127)/12 6	22(145)/15 2	3(145)/2 1	66(143)/46 1	59(143)/41 2	2(123)/1 6	0(81)/0	3(139)/2 1	–	–	–	–	–	–
Individuals	17(58)/29 3	9(55)/16.4	16(65)/24.6	2(67)/3	47(72)/65 3	39(70)/55.7	2(56)/3 6	0(36)/0	2(66)/3	3(51)/5 9	10(52)/19 2	2(58)/3 4	34(87)/39 1	67(98)/68 4	35(104)/33 6

Note Here and in Table 2, figures before the slash are absolute numbers (with total observation number in parentheses); figures after the slash are percentages

Table 2. Dental characteristics of local Pazyryk groups from Gorny Altai

Local group	I^1 shoveling	I^2 shoveling	Accessory cusp on M^1	Carabelli cusp on M^1	Carabelli cusp on M^2	Hypocone reduction (4-) on M^1	Hypocone reduction (3, 3+) on M^2	Enamel extention (4-6) on M^1	Enamel extention (4-6) on M^2	6 M_1
					Males					
Ulandryk	0(3)/0	1(2)/50	0(6)/0	0(5)/0	1(6)/16 7	0(9)/0	4(6)/66 7	0(10)/0	2(7)/28 6	0(7)/0
Yustyd	1(2)/50	2(2)/100	0(4)/0	1(4)/25	0(4)/0	0(4)/0	0(5)/0	0(5)/0	1(4)/25	0(3)/0
Barburgazy and Buguzun	0(2)/0	2(2)/100	0(3)/0	0(3)/0	0(3)/0	0(3)/0	3(5)/60	0(4)/0	1(4)/25	0(3)/0
Ukok	1(7)/14 3	5(7)/71 4	0(5)/0	0(5)/0	0(5)/0	0(4)/0	4(7)/57 1	2(8)/25	3(8)/37 5	0(5)/0
Chuya, Ursul, and Middle Katun	0(3)/0	4(6)/66 7	0(5)/0	0(4)/0	0(4)/0	0(7)/0	1(5)/20	1(8)/12.5	4(5)/80	1(4)/25
Kara-Koba	0(3)/0	2(3)/66 7	–	0(3)/0	0(3)/0	0(3)/0	1(3)/33 3	0(3)/0	0(3)/0	0(1)/0
					Females					
Ulandryk	0(1)/0	1(2)/50	0(4)/0	1(4)/25	2(5)/40	0(6)/0	2(6)/33 3	0(9)/0	3(6)/50	0(4)/0
Yustyd	2(3)/66 7	2(4)/50	0(10)/0	1(9)/11 1	0(10)/0	0(9)/0	4(10)/40	1(9)/11 1	2(10)/20	0(11)/0
Barburgazy and Buguzun	0(1)/0	2(3)/66 7	0(5)/0	1(6)/16 7	0(4)/0	0(8)/0	1(6)/16 7	1(7)/14 3	2(4)/50	0(5)/0
Ukok	3(4)/75	5(5)/100	0(4)/0	0(4)/0	1(5)/20	1(4)/25	4(7)/57 1	1(8)/12 5	1(7)/14 3	0(6)/0
Chuya, Ursul, and Middle Katun	1(3)/33 3	4(4)/100	0(7)/0	0(7)/0	0(4)/0	0(10)/0	3(7)/42 9	1(10)/10	2(3)/66 7	0(7)/0
Kara-Koba	0(1)/0	1(1)/100	0(2)/0	0(3)/0	0(2)/0	0(3)/0	2(2)/100	0(1)/0	0(2)/0	0(3)/0
					Total + children					
Ulandryk	0(4)/0	2(4)/50	0(10)/0	1(9)/11.1	3(11)/27.3	0(15)/0	6(12)/50	0(19)/0	5(13)/38.5	0(11)/0
Yustyd	4(6)/66 7	7(9)/77.8	0(19)/0	3(19)/15 8	0(15)/0	2(20)/10	4(15)/26 7	1(22)/4 5	3(15)/20	0(17)/0
Barburgazy and Buguzun	0(3)/0	4(5)/80	0(8)/0	1(9)/11 1	0(7)/0	0(11)/0	4(11)/36 4	1(11)/9 1	3(8)/37 5	0(8)/0
Ukok	6(13)/46 1	11(13)/84 6	1(11)/9.1	1(10)/10	1(10)/10	2(10)/20	8(15)/53 3	3(17)/17 6	4(15)/26 7	0(12)/0
Chuya, Ursul, and Middle Katun	3(9)/33 3	11(13)/84 6	0(14)/0	1(13)/7 7	0(8)/0	1(18)/5 6	5(13)/38.5	2(19)/10 5	6(9)/66 7	1(14)/7 1
Kara-Koba	0(4)/0	3(4)/75	0(2)/0	0(6)/0	0(5)/0	0(6)/0	3(5)/60	0(4)/0	0(5)/0	0(4)/0

Table 2 (continued)

Local group	4M$_1$	4M$_2$	5M$_2$	5M$_{1+}$	XM1(4-6)	YM$_2$	3YM$_2$	M$_{2+}$	XM$_2$
Males									
Ulandryk	2(7)/28 6	7(8)/87 5	0(9)/0	4(6)/66 7	1(6)/16 7	3(8)/37 5	0(8)/0	4(9)/44 4	5(9)/55 6
Yustyd	3(5)/60	4(6)/66 7	3(7)/42 9	0(3)/0	1(3)/33 3	3(5)/60	1(4)/25	4(6)/66 7	3(6)/50
Barburgazy and Buguzun	1(3)/33 3	4(4)/100	0(3)/0	1(3)/33 3	0(3)/0	0(3)/0	0(3)/0	3(4)/75	1(3)/33 3
Ukok	2(5)/40	5(6)/83 3	1(6)/16 7	0(4)/0	0(3)/0	2(6)/33.3	0(5)/0	4(6)/66 7	3(6)/50
Chuya, Ursul, and Middle Katun	2(6)/33 3	5(5)/100	0(6)/0	1(4)/25	0(3)/0	0(6)/0	1(7)/14 3	2(4)/50	2(4)/50
Kara-Koba	1(1)/–	3(3)/100	0(3)/0	0(3)/0	–	0(3)/0	0(3)/0	3(3)/100	1(3)/33 3
Females									
Ulandryk	0(4)/0	8(8)/100	0(3)/0	2(6)/33 3	0(4)/0	2(5)/40	0(5)/0	7(7)/100	1(7)/14 3
Yustyd	6(11)/54 5	11(12)/91 7	2(13)/15 4	3(11)/27 3	1(11)/9 1	2(12)/16 7	0(12)/0	8(12)/66 7	8(13)/61 5
Barburgazy and Buguzun	0(5)/0	6(7)/85 7	1(12)/8 3	0(4)/0	0(4)/0	1(6)/16 7	0(7)/0	6(7)/85 7	3(6)/50
Ukok	1(6)/16 7	4(6)/66 7	2(6)/33 3	2(5)/40	1(5)/20	2(6)/33 3	0(5)/0	4(6)/66 7	4(6)/66 7
Chuya, Ursul, and Middle Katun	1(7)/14 3	8(9)/89	2(7)/28 6	2(5)/40	0(5)/0	1(6)/16 7	0(6)/0	2(4)/50	6(10)/60
Kara-Koba	0(3)/0	1(1)/100	0(1)/0	0(2)/0	0(2)/0	0(1)/0	0(1)/0	0(1)/0	1(1)/–
Total + children									
Ulandryk	2(11)/18 2	15(16)/93 7	0(12)/0	6(12)/50	1(10)/10	5(13)/38 5	0(13)/0	11(16)/68 7	6(16)/37.5
Yustyd	9(19)/47 4	15(19)/78 9	5(20)/25	4(18)/22 2	4(17)/23 5	5(18)/27.8	1(17)/5 9	12(18)/66 7	11(19)/57 9
Barburgazy and Buguzun	1(8)/12 5	10(11)/90 9	1(15)/6 7	1(8)/12 5	0(7)/0	1(8)/12 5	0(10)/0	9(11)/81 8	4(9)/44 4
Ukok	3(12)/25	9(13)/69 2	4(13)/30 8	3(11)/27 3	1(9)/11 1	4(13)/30 8	0(11)/0	8(13)/61 5	8(13)/61 5
Chuya, Ursul, and Middle Katun	4(16)/25	16(17)/94 1	2(14)/14.3	3(11)/27 3	3(12)/25	1(13)/7 7	1(14)/7 1	5(10)/50	10(17)/58.8
Kara-Koba	1(4)/25	4(4)/100	0(4)/0	0(5)/0	0(2)/0	0(1)/0	0(4)/0	3(4)/75	2(4)/50

Table 2 (continued)

Local group	Distal trigonid crest on M_1	Deflecting wrinkle on M_1	Three-rooted M_1	Diastema	General crowding	I^2 crowding	Hypodonty	Torus palatinus	Torus mandibularis
Males									
Ulandryk	0(7)/0	0(5)/0	0(8)/0	0(4)/0	1(3)/33.3	0(4)/0	5(10)/50	9(13)/69.2	2(13)/15.4
Yustyd	0(3)/0	0(1)/0	0(5)/0	1(6)/16.7	1(6)/16.7	0(6)/0	5(8)/62.5	6(9)/66.7	6(11)/54.5
Barburgazy and Buguzun	0(3)/0	–	1(4)/25	0(4)/0	1(4)/25	0(4)/0	2(7)/28.6	7(7)/100	2(7)/28.6
Ukok	0(3)/0	0(1)/0	0(6)/0	1(4)/25	2(7)/28.6	0(7)/0	2(11)/18.2	6(9)/66.7	9(10)/90
Chuya, Ursul, and Middle Katun	0(4)/0	0(2)/0	0(4)/0	0(4)/0	1(4)/25	1(4)/25	1(9)/11.1	7(10)/70	4(9)/44.4
Kara-Koba	–	–	0(2)/0	1(3)/33.3	2(3)/66.7	1(3)/33.3	0(2)/0	4(4)/100	0(3)/0
Females									
Ulandryk	0(4)/0	0(2)/0	1(7)/14.3	0(2)/0	0(2)/0	0(2)/0	5(7)/71.4	8(11)/72.7	1(11)/9.1
Yustyd	1(11)/9.1	0(10)/0	0(12)/0	0(7)/0	1(7)/14.3	0(7)/0	5(12)/41.7	6(12)/50	3(18)/16.7
Barburgazy and Buguzun	0(3)/0	0(2)/0	0(7)/0	1(8)/12.5	0(8)/0	0(8)/0	3(7)/42.9	8(10)/80	3(10)/30
Ukok	0(5)/0	0(3)/0	0(4)/0	0(4)/0	2(4)/50	1(4)/25	1(6)/16.7	2(5)/40	1(5)/20
Chuya, Ursul, and Middle Katun	0(5)/0	0(3)/0	0(6)/0	0(6)/0	1(6)/16.7	0(6)/0	4(8)/50	8(12)/66.7	3(12)/25
Kara-Koba	–	–	0(2)/0	0(2)/0	1(2)/50	0(2)/0	0(3)/0	3(3)/100	1(3)/33.3
Total + children									
Ulandryk	0(11)/0	0(7)/0	1(15)/6.67	0(6)/0	1(5)/20	0(6)/0	10(17)/58.8	17(24)/70.8	3(24)/12.5
Yustyd	1(14)/7.1	0(14)/0	0(19)/0	1(13)/7.7	2(13)/15.4	0(13)/0	10(21)/47.6	13(22)/59.1	9(25)/36
Barburgazy and Buguzun	0(6)/0	0(2)/2	1(11)/9.1	1(12)/8.3	1(12)/8.3	0(12)/0	5(14)/35.7	15(17)/88.2	5(17)/29.4
Ukok	0(10)/0	0(6)/0	0(11)/0	1(8)/12.5	4(11)/36.4	1(12)/8.3	3(16)/18.7	8(13)/61.5	12(16)/75
Chuya, Ursul, and Middle Katun	1(13)/7.7	0(7)/0	0(9)/0	0(10)/0	2(10)/20	1(11)/9.1	5(17)/29.4	15(22)/68.2	7(21)/33.3
Kara-Koba	–	–	0(4)/0	1(5)/20	3(5)/60	1(6)/16.7	0(5)/0	7(7)/100	1(6)/16.7

In the Pazyryk sample the six-cusped first molar is quite rare: it was found in one male from central Gorny Altai (1.6% of the total number of observations). It was not found in the Kara-Koba group.

Reduced four-cusped first molars, too, are important criteria for geographical comparisons. They are typical of Caucasoids and, according to Zubov (1979) and Khaldeyeva (Zubov, Khaldeyeva, 1989, 1993) are relevant for separating trait combinations within the Caucasoid stock, specifically "northern and southern gracile" from "central and northern European archaic massive." Ranging from zero to 35% on the world scale, the lowest frequencies of the trait are seen in Eurasian Mongoloids, Africans, and native Australians (0 – 5%, according to Scott and Turner (1997)). Groups with the "gracile Caucasoid" dental trait combination reveal the highest incidence (above 20%), and in those with the "massive Caucasoid" combination, the frequency is virtually the same as in Mongoloids (Zubov, Khaldeyeva, 1993).

In the pooled Pazyryk sample and its local constituents the frequency is close to the world maximum and even higher (28.8%, in the pooled group; Yustyd, 47 4%; Ukok and central Gorny Altai, 25%; see Tables 1, 2). The only preserved M_1 in the Kara-Koba group has four cusps, which may suggest that the trait was common.

The highest frequency of the four-cusped second molar was registered in Caucasoids (average, 88 8%; with a very narrow variation range, 75 – 90%) (Zubov, Khaldeyeva, 1993). Mongoloids, in contrast, show an extreme diversity, with the frequencies ranging from minimal to maximal on the world level. According to Scott and Turner, populations of the Altai show a moderate occurrence (30 – 60%).

Frequencies in the Pazyryk and Kara-Koba material are above 80% in all local groups (see Tables 1, 2).

Arrangement of cusps on the lower molars According to Zubov and Khaldeyeva (1993), *+5* pattern on M_1 is especially diagnostic. Its world variation limits are 0 – 35%. Because the variation within each major geographical group is high, the trait is important for comparing local populations. The frequency in the pooled Pazyryk sample is rather high (29.3%) It is maximal in Ulandryk (66.7% in males, and 33.3% in females). The central Gorny Altai group, too, shows high frequencies. In Yustyd and Ukok, the trait was found in females only, and the occurrence is high (27.3 and 40%, respectively). In Kara-Koba, not a single case was observed. Judging by the tables of world distribution (Zubov, 1973), the frequency of *5*M_1*+* in the Pazyryk people is close to those in populations of northwestern Eurasia, western Central Asia (Uzbeks), India, and Japan. In Mongoloids of northeastern Eurasia, Siberia, and China, the trait is very rare.

A relatively rare variant, *3Y* on M_2, is informative for comparisons between Caucasoid populations (Zubov, Khaldeyeva, 1993). Its world range being just 0 – 10%, maximal frequencies were registered in southern Caucasoids (populations of northern India and Tajiks of Pamirs (Ibid.)). In Ossets, too, the trait is frequent (13%) (Zubov, 1973). Judging by Zubov's data concerning the world distribution, it is virtually absent in other groups, either prehistoric or modern (Ibid.). On this background, the occurrence in the Pazyryk people is rather high (3%), but all these cases were observed in males, and in just two local groups, Yustyd and central Gorny Altai (see Tables 1, 2).

Distal trigonid crest on M_1 is highly diagnostic at various taxonomic levels. According to Zubov and Khaldeyeva (1993), maximal frequencies (30 – 50%) are seen in Mongoloid and Veddoid populations, whereas in Caucasoids and African Blacks the trait is rare (0 – 10%) (Ibid.).

In the Pazyryk series, the distal trigonid crest was observed in just one case (a female from Yustyd).

Deflecting wrinkle of metaconid on M_1 exhibits a similar tendency on the world level. Maximal frequencies are seen in Mongoloids, including Selkups and certain Finno-Ugric populations. Caucasoids show the lowest incidence (sometimes even absence) of the trait (Ibid.). In the Pazyryk material, too, not a single case was registered (see Tables 1, 2)

Three-rooted M_1. A detailed study of the world distribution of this feature was carried out by Turner. According to the recent summary (Scott, Turner, 1997), the highest frequencies (above 20%) occur in Mongoloids of northeastern Eurasia and in Arctic populations of America, that is, in Sinodonts. In Sundadonts and American Indians, the frequencies are usually within 5 – 15%. The trait is quite rare (0 – 5%) in North Africa, West Eurasia, South Siberia, Australia, and Oceania.

In Pazyryk people, too, the characteristic is rare (3% on average). It was found only in Barburgazy and Buguzun males and in Ulandryk females.

Discussion

Overall, the combination of descriptive dental traits of Pazyryk and Kara-Koba displays features that are suggestive of affinities with various major population groups of modern mankind. The first differentiation level is characterized by a combination of Caucasoid and Mongoloid dental traits. Low frequencies of enamel extension, distal trigonid crest, absence of the metaconid deflecting wrinkle, and advanced gracilization of the second upper molar and the first and second lower molars, make up a combination which normally differentiates various Caucasoid groups. On the other hand, the presence of the Mongoloid component (in the broad sense) in the Pazyryk series is evidenced by a combination of a rather frequent shovel-shaped upper medial incisors, low incidence of the Carabelli cusp, and a high degree of third molar hypodonty.

Also, the Pazyryk people display various combinations typical of lower-level population groups. For instance, they are close to Kazakhs, Kirghiz, and Khakasians (anthropometrically, all these display traits of the South Siberian complex) by having a high percentage of diastemas, moderate to high crowding, and moderate occurrence of medial incisor shoveling. They resemble certain southern Caucasoids, such as Azerbaijanis and Dagestanis, by the degree of first and second molar gracilization; and they tend toward East Siberians (Buriats and people of Southeast Asia) by a low incidence of the Carabelli cusp, the frequency of the third molar absence, and of the maxillary and mandibular tori.

Especially noteworthy is the high frequency of the relatively uncommon variant 3Y on M_2 in the Pazyryk group, in comparison to that in the Ossets. In this respect, a remark made by Zubov and Khaldeyeva (1993: 83) may be recalled, concerning the possible association of this pattern with the Aryans.

Some attention should be given to sex and local differences within the Pazyryk group. The former are rather regular and cannot be due to small sample size or to scoring errors. Indeed, in females, a concentration of Mongoloid features is observed: high frequency of upper medial incisor shoveling (50% as against 12.5% in males), lower frequency of four-cusped lower second molars (25.8% versus 38.5% in males), higher occurrence of third molar absence (45% versus 34%, respectively). Also, Pazyryk females, unlike males, display such Mongoloid features as hypocone reduction on the first upper molar (pattern 4-) and distal trigonid crest. In the male series, on the other hand, a southern Caucasoid marker, 3Y on M_2 was observed.

Concerning local differences, an unusual combination of eastern and western traits is seen in Yustyd and Ukok (maximal frequency of upper medial incisor shoveling, hypocone reduction on the first upper molar, high occurrence of hypocone reduction on the second upper molar and four-cusped first lower molar, as well as instances of 3Y pattern on the second lower molar). Dentally, then, in terms of hybridization between eastern and western major geographical groups, these two local Pazyryk populations appear to be the most admixed.

In the central Gorny Altai sample (the Chuya, Ursul, and the Middle Katun valleys), the frequency of 3Y pattern on M_2 is maximal, suggesting that this local Pazyryk population was closer related to southern Caucasoids than were other local groups.

The complexity of the dental combination displayed by the Pazyryk people may attest to hybridization in which South Siberian, Near Eastern, and Central Asian groups had participated. Findings of dental studies, then, are consistent with the results of cranial analysis.

The Kara-Koba people differs from the Pazyryk people and resemble North Eurasian Mongoloids by the absence of the Carabelli cusp or *+5* pattern on M_1. However, unlike their Pazyryk counterparts, they lack such Mongoloid (Sinodont) dental traits as enamel extension on the first and second upper molars or any variants of hypodonty or tori, either maxillary or mandibular. Diastemas are more frequent in Kara-Koba than in Pazyryk. All lower molars in the Kara-Koba sample are reduced and four-cusped, as in northern and southern gracile Caucasoid dental combinations. A peculiar feature of the Kara-Koba people is an extremely high frequency of reduced (three-cusped) upper second molars.

Overall, the combination of dental traits in the Kara-Koba sample, like in the Pazyryk sample, apparently attests to hybridization, but the proportion of parental components must have been different. The Kara-Koba people, unlike the Pazyryk people, do not exhibit either a Near Eastern or a North Asian tendency. Rather, their affinities were with northern dentally gracile Caucasoids and with western and central Siberians.

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LIST OF ABBREVIATIONS

AN SSSR – USSR Academy of Sciences

BNC SO RAN – Buryat Science Center of the Siberian Branch, Russian Academy of Sciences

GANIIIYL – Gorno-Altaisk Research Institute of History, Linguistics and Literature (Gorno-Altaisk)

IAE SO RAN – Institute of Archaeology and Ethnography, Siberian Branch of the Russian Academy of Sciences (Novosibirsk)

IIFF – Institute of History, Philology, and Philosophy, Siberian Branch of the USSR Academy of Sciences (Novosibirsk)

IIMK RAN – Institute of History of Material Culture of the Russian Academy of Sciences (St. Petersburg)

KSIA – Brief Communications of the Institute of Archaeology, the USSR Academy of Sciences

RAN – Russian Academy of Sciences

SB RAS – Siberian Branch of the Russian Academy of Sciences

TIE – Proceedings of the Institute of Ethnography, Russian Academy of Sciences

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PALEOENVIRONMENT. THE STONE AGE

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DYNAMICS OF PLEISTOCENE PALEOCLIMATIC EVENTS: A RECONSTRUCTION BASED ON PALYNOLOGICAL AND ELECTRON SPIN RESONANCE STUDIES IN NORTH EURASIA*

Introduction

Reactions of various components of the Pleistocene environment to multiple climatic changes are a global phenomenon. Because all elements of the landscape geosphere are closely interrelated, certain individual parameters of each element provide a potential source of qualitative assessment of all the remaining parameters, and of the entire environment. The source of evidence concerning the pattern of their temporal changes is marine and continental deposition sedimentation under various regimes.

Most of the paleoenvironmental records of the Quaternary, however, are limited in the degree of age control. Absolute dates are normally available for the latest time intervals lying within the range of the radiocarbon dating method (ca 30 ka and later). Earlier paleogeographical events are mostly dated indirectly, by their comparison with the deep-sea isotope record. The chronological scale of the latter was calibrated for age by the orbital tuning method (Imbrie et al., 1984) using the periodicity established by means of astronomical calculations that have yielded chronological ranges for the key levels of isotope curves

Regrettably, the interpretation of isotope data is not always unequivocal, mostly due to the interruption of sedimentation, insufficient stratigraphic resolution, bioturbation, hypergenesis of sediments, and other factors which may create problems with the correlation between the continental and deep-sea records. Despite that, the oxygen isotope analysis of deep-sea sediments provides a rather complete record of climatic changes that occurred during the Quaternary, and it is still one of the most powerful tools for correlating and reconstructing paleoenvironments.

Among the Pleistocene continental generations, which are geologically no less complete than oceanic sediments, is the loess-paleosol formation (LPF). Unlike the glacial, alluvial, and other Late Cenozoic formations of North Eurasia, LPF is characterized by almost uninterrupted sections which, in various regions of its distribution area, are represented by sediments of one, two, or all stages of the Pleistocene. Their thickness in the southern East European Plain and in western Central Asia can be 100 m and more.

The most promising method used for climato-stratigraphic subdivision of the sediments and the periodization of paleoclimatic events of the Pleistocene is pollen analysis. Thanks to a detailed palynological study of reference sections of the most

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characteristic loess regions, an uninterrupted succession of Late Cenozoic interglacial and glacial landscape-climatic sequences was reconstructed for the first time. These reconstructions reflect global climatic changes that occurred in various natural environments and evidently should have correlatives in paleoclimatic records of deep-sea sediments

However, a meaningful interpretation of the results of LPF and a resolution of issues concerning the correlation of paleogeographical events in the glacial-periglacial and extraglacial continental zones with global climatic rhythms and fluctuations of the World Ocean level requires a reliable chronostratigraphic binding of identified paleoclimatic events with respective horizons. It is essential that relationships between independent climate-response records such as long continental pollen sequence and the global deep-sea oxygen isotope record, should be established using a combination of independent control levels such as dated horizons reflecting global environmental changes

In coastal sediments, subfossil mollusk shells are frequently found. Here, because of the postglacial isostatic rise of the crust, they occur in formations now lying above the present sea level. The dating of these marine fossils provides an independent chronology of changes in the sea level and deglaciations. Considering the difficulties with establishing dates beyond the range available for the radiocarbon method, and the fact that the electron spin resonance (ESR) method enables one to establish the age of the shells not only of marine mollusks (Molodkov, 1988) but also of land and freshwater ones (Molodkov, 1993), the chronostratigraphy based on the ESR analysis of shells is a powerful tool for establishing direct sea-land correlations. The present study focuses on the palyno-chronostratigraphic reconstruction and correlation of Pleistocene climatic events using original pollen data concerning the loess-paleosol formation (Bolikhovskaya's 1967 – 2001 studies) and ESR-chronostratigraphy of marine and freshwater sediments as well as cave site deposits dating from the Stone Age (Molodkov's 1982 – 2001 studies).

Methods

The palynological analysis used in this study is of wide application employed in modern stratigrapho-paleogeographical research aimed at reconstructing landscape-climatic conditions of sedimentation, the assessment of the stratigraphic position of sediments, and carrying out intra-regional and interregional correlations of geological bodies and paleogeographical events. The key role of palynology in paleobotanical studies is mainly bacause pollen and spores of higher plants are the only important objects from the standpoint of both paleobotany and paleontology since they are present in deposits of all lithogenetic types. Thanks to that, pollen data make it possible to characterize all stages of Pleistocene sedimentation and reconstruct an uninterrupted succession of changes in fauna, vegetation, and climate within each stage. With regard to paleogeography of the loess-paleosol formation, this is the only climato-stratigraphic method capable of reconstructing landscape-climatic environments not only for the soil-formation periods, but for the loess-accumulation stages as well.

At present, results of palynological studies of reference sections of the glacial-periglacial and extraglacial zones, reflecting the succession of vegetation following changes of moisture and heat supply in the Pleistocene, yield the most complete record of climatic conditions on the land. The structure of this record can be directly compared with the climate-dependent curve of oxygen isotopy of deep-sea sediments (Shackleton, Opdyke, 1973; Bassinot et al., 1994) and that of land formations (Winograd et al., 1992). However, here too, as in the case of any spatio-temporal comparison of paleogeographical events in Earth's geological history, it may be asked whether these correlations are chronologically reliable, especially considering the current controversy regarding the climatic periodization of the Late Cenozoic. Ideally, any stratigraphic study and the subsequent correlation of strata and events must be accompanied by establishing the absolute age of relevant deposits. Actually, however, because the available methods of absolute geochronology are few or inapplicable to the specific time range or to the specific objects, and due to other reasons as well, this condition is not frequently met. As a reasonable alternative, one can consider the possibility of establishing a temporal correspondence of climatic signals in various paleoenvironmental records, e.g , in terrestrial deposits and deep-sea sediments, by comparing these signals with the chronostratigraphic succession of geological bodies containing information about the changes of climatic conditions and environments.

Objects which appear to be among the most suitable for this task are uplifted marine deposits of the northern fringes of the Eurasian continent, where drastic changes of environments followed recurring glaciations and transgressions of the Polar Basin under the global warming. The application of the new version of the ESR method for dating mollusk skeletal remains introduced by one of the present authors (Molodkov, 1988, 1989a,b, 1992, 1993), has opened up new possibilities for using fauna-bearing deposits of raised marine horizons in the geohistorical periodization of paleoclimatic events in the Quaternary history of continental fringes, and their correlation with highly diverse materials concerning loess-soil series and deep-sea sediments.

The ESR-dating of subfossil mollusk shells is based on the direct measurement of the amount of radiation-induced paramagnetic centers (carbonate centers) that have been created in shell substance due to natural radiation. The concentration of these defects is proportional to the paleodose accumulated over the relevant period. Their formation in the shell substance is caused by natural radiation resulting from radioactivity in the shell itself and from the environment (embedding matrix and cosmic). The intensity of the observed ESR signal is correlated with the number of radiation-induced defects and, consequently, with the accumulated paleodose and with the age of the shell. The latter may be considered synchronous with the enclosing deposits.

The age of the shells is evaluated using the ratio of the accumulated paleodose (measured by means of the ESR analysis of the shell substance) to the total intensity of alpha and beta particle flux as well as that of gamma quanta and cosmic radiation. The version of ESR method used in this study enables one to estimate the age of shells within the range of several hundred to about a million years.

Concerning the correlation of Pleistocene events, the ESR dating method is highly promising because it allows the use of subfossil mollusk shells (the most frequent and widespread group of paleofaunistic remains in Pleistocene deposits) in determining the ages of many geological formations of the Pleistocene, quite diverse in origin, such as marine and paleolacustrine sediments, loesses, paleosols, glacial lacustrine loam, cave deposits, archaeological sites, etc. ESR analysis of shells provides a basis for a detailed chronostratigraphic binding and for an inter-regional correlation of fauna-bearing deposits belonging to different facies.

Objects and regions studied

The objects chosen for the reconstruction of a continuous paleogeographical record of the Pleistocene are reference sections of the central and southern areas of the East European Plain (Fig. 1). Due to the repeated development of continental ice sheets, permafrost, and loess formation, as well as to the transgressions and regressions of the southern seas in the Pleistocene, this territory is one of the key areas of North Eurasia where the establishment of the climatic stratigraphy of deposits and the periodization of paleoclimatic events over the past 800 ka have proved successful.

The East Caucasian Piedmont is one of the most distant loess areas from the continental ice sheet. It is here that the largest profiles of the European LPF are situated. A comprehensive study into the Pleistocene subaerial, deluvial-proluvial, and alluvial deposits, the total depth of which is 140 m, was carried out by N.S. Bolikhovskaya, A.A. Velichko, E.I. Virina, A.K. Markova, T.D. Morozova, V.P. Udartsev, and others, using bore-holes and outcrops near Otkaznoe. Changes of landscape-climatic conditions over all the 15 interglacial and glacial events of the Brunhes chron were reconstructed (Bolikhovskaya, 1995) (Fig. 2, A). Judging by palynological data, the Matuyama-Brunhes reversal is situated in the upper part of the Pokrovka deposits.

The Oka-Don glacial-periglacial region occupies the respective plain and the eastern fringes of the Central Russian Upland within the area of the Don glacial till. Here, near Strelitsa (20 km west of Voronezh) on the watershed and the adjoining slope, Neogene-Pleistocene deposits, over 60 m in total thickness, were revealed by quarries. Their comprehensive study was carried out by A.K. Agadjanian, N.S. Bolikhovskaya, A.A. Velichko, E.I. Virina, E.P. Zarrina, I.I Krasnov, T.D. Morozova, V.P. Udartsev, and others. The results of the palynological analysis obtained on subaerial, alluvial, lacustrine, and fluvioglacial formations underlying and overlying the Don glacial till have made it possible to reconstruct the vegetation and climate of all the interglacial and glacial stages over the past 780 ka (Ibid.) (Fig. 2, B). No less important are the data concerning the loess-paleosol series (LPS) underlying the till and overlying the red-coloured soil. LPS is represented here by two paleosols separated by a horizon of loess-like loam. LPS pollen spectra reflect the successions of vegetation and climate of two interglacial events and an intermediate cooling. Based on a comparison of these climato-phytocoenotic reconstructions with paleogeographical materials from Novotroitskoe, Petropavlovka, Otkaznoe, and other sections, the Strelitsa LPS corresponds to the Il'inka horizon of the inter-regional scale. Since the first representative paleobotanical data that allowed a climatostratigraphic subdivision of Il'inka deposits came from the Strelitsa section, it was proposed to describe the early Il'inka interglacial as Gremyachie, the late Il'inka interglacial as Semiluki, and the cooling event separating them as Devitsa, after the respective toponyms (the Devitsa is a river, and Gremyachie and Semiluki are villages) (Bolikhovskaya, 1994a).

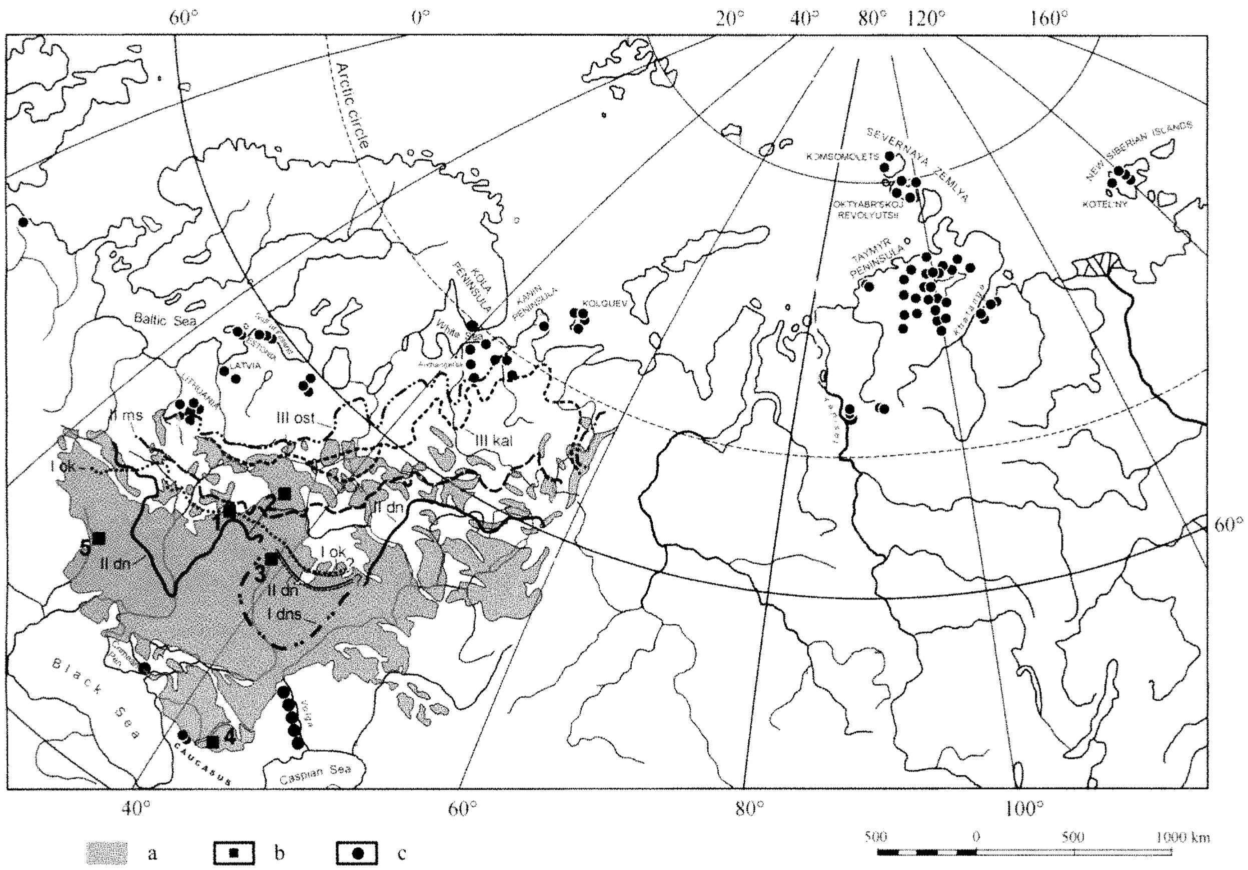


Fig. 1. Map showing the position of the studied loess-paleosol sections.
a – distribution of loesses on the East European Plain; *b*: 1 – Strelitsa, 2 – Arapovichi, 3 – Likhvin, 4 – Otkaznoe, 5 – Molodova; *c* – sections studied by ESR method and limits of Pleistocene glaciations (after (Zarrina, 1991)): I dns – Don, I ok – Oka, II dn – Dnieper, II dn, I ok – assumed Dnieper and Oka, II ms – Moscow, III kal – Kalinin, III ost – Ostashkovo.

The Northern Central Russian glacial-periglacial region is situated in the northern part of the Central Russian Upland within the area of the Dnieper ice sheet. Here, the composition and structure of Quaternary deposits and most paleogeographical events of the Pleistocene are reflected by the Likhvin section situated on the left bank of the Oka River, 1 km north of Chekalin (formerly Likhvin). The section is a stratotype of the Likhvin interglacial of East Europe. Results of its comprehensive study were published by N.N. Bogolyubov, V.N. Sukachev, V.P. Grichuk, K.A. Ushko, E.N. Ananova, A.K. Agadjanian, N.S. Bolikhovskaya, N.I. Glushankova, N.G. Sudakova, etc. An outcrop, stretching over 2 km along the river, as well as additional trenches and bore-holes reveal a 50-meter-thick succession of loess-paleosol, glacial (till and lacustrine-glacial), alluvial, and lacustrine sediments. The palynological characteristics of the entire succession of the deposits have made it possible to establish their detailed stratigraphic subdivision and reconstruct a vast diversity of landscape and climatic changes that occurred on the Upper Oka from the Don glacial to the Holocene. New findings shed light on the interglacial/glacial status of the Oka-Dnieper warm and cold intervals that were previously merged into a long and complex formation referred to by us as "Macro-Likhvin" (Bolikhovskaya, 1975). The section, then, is a stratotype of not just the Likhvin *s. str.* interglacial, but of subsequent pre-Dnieper intervals including the Kaluga glacial (cooling), Chekalin interglacial, Zhizdra glacial (cooling), and Cherepet interglacial. To coordinate these with the interregional scale, it was suggested to merge the Oka-Dnieper thermo- and cryochrons into the Likhvin complex regarding it as a superhorizon (Bolikhovskaya, 1994b).

The most detailed studies of Late Pleistocene loess-paleosol horizons were carried out in two regions. One is ***the Desna-Dnieper glacial-periglacial region*** situated in the northeastern Dnieper Lowland within the area of the Dnieper glacial. Here, in the Arapovichi section on the right bank of the Desna River, 12 km southwest of Novgorod-Seversky,

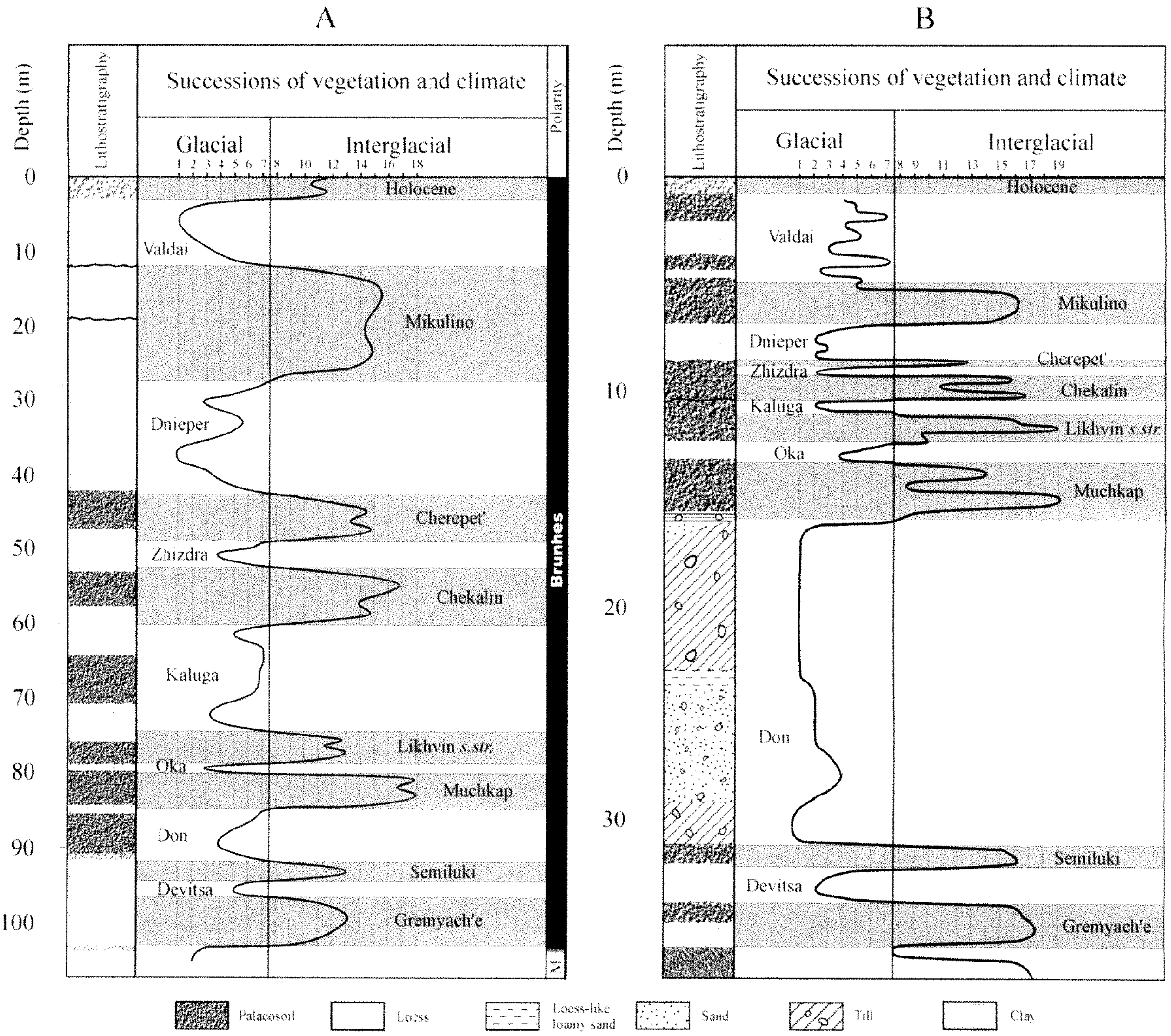


Fig. 2. Lithology of loess-paleosol sections at Otkaznoe (*A*) and Strelitsa (*B*) with climatostratigraphic subdivision and reconstruction of vegetation and climate using palynological data (after (Bolikhovskaya, 1995)).

The East Caucasian Piedmont region (*A*): 1 – periglacial semi-deserts and dry steppes; 2 – periglacial steppes; 3 – periglacial forest-steppes; 4 – birch and coniferous-birch open woodlands; 5 – extraglacial forest-steppes; 6 – extraglacial birch open woodlands; 7 – extraglacial spruce and cedar- spruce forests; 8 – birch open woodlands with broad-leaved tree species; 9 – birch forests with broad-leaved tree species; 10 – coniferous-birch and birch-coniferous forests with broad-leaved tree species; 11 – forest-steppes; 12 – steppes; 13 – piedmont forest-steppes; 14 – shrub hornbeam groves; 15 – elm-oak, oak, and hornbeam-oak forests; 16 – hornbeam forests; 17 – oligo- and polydominant broad-leaved forests; 18 – polydominant broad-leaved forests with subtropical taxa.
The Oka-Don region (*B*): 1 – ice cover; 2 – periglacial tundra; 3 – periglacial forest-tundra; 4 – periglacial steppe; 5 – periglacial forest-steppe; 6 – pine-birch open woodlands; 7 – extraglacial steppes; 8 – pine-birch forests; 9 – birch forests with broad-leaved tree species; 10 – pine-birch forests with broad-leaved tree species; 11 – birch-pine forests with broad-leaved tree species; 12 – spruce-pine-birch forests with broad-leaved tree species; 13 – pine-birch-broad-leaved forests; 14 – spruce-pine-birch-broad-leaved forests; 15 – broad-leaved forests; 16 – forest-steppes; 17 – steppes; 18 – coniferous forests with rare subtropical taxa; 19 – mixed coniferous-broad-leaved forests with rare subtropical taxa.

the Dnieper till is overlain by 14-meter-thick Late Pleistocene loesses and paleosols. The pollen spectra of this formation characterize the successions of vegetation and climate of the Mikulino interglacial and of most Valdai interstadials and stadials. In the extraglacial zone, a detailed subdivision of Late Pleistocene horizons and landscape-climatic reconstructions were carried out for the Middle Dniester drainage basin belonging to the ***Dniester-Prut region***. Here, the most representative Late Pleistocene formations were revealed by sections of the second flood-plain terrace of the Dniester composed of 10-meter-thick alluvial sediments, and a more than 25-meter-thick loess aeolian-deluvial formations with eight paleosols. It is on the second Dniester flood-plain terrace that the well-known Paleolithic sites are situated. Based on the data from Molodova I and V, Korman IV, Ketrosy, and other sections studied by I.K. Ivanova, A.P. Chernysh, A.K. Agadjanian, N.K Anisyutkin, S.V. Gubin, N.V. Rengarten, and others, and on the results of pollen analysis (Pashkevich, 1977; Bolikhovskaya, 1981, 1982, 1987), stages of vegetation and climate development of the Mikulino interglacial as well as those of 19 Valdai intervals (9 interstadials and 10 stadials) were characterized.

A radiometrically based proxy record of climate and sea level changes over the past 600 ka was obtained using more than 230 mollusk shell samples collected mostly from climate-controlled marine sediments along the continental fringes of North Eurasia (see Fig. 1). The shells were dated using the ESR method to produce an independent mollusk-based chronology for multiply marine transgression (relatively high sea-level stands) during which large epicontinental basins occupied vast territories of North Eurasia coast. Some high sea-level evidence has also been obtained from sites in the Caspian and Black Sea basins. In addition, dating results on freshwater mollusk shell samples from interglacial lacustrine deposits in the Southern Baltic and terrestrial mollusk fossils from a Lower Paleolithic culture-bearing deposits in the Northern Caucasus have also been used.

Climato-stratigraphic subdivision of Pleistocene deposits of the glacial-periglacial, and extraglacial zones of the East European Plain

At present, the main problem related to periodization and correlation of paleogeographical events using pollen data is that reconstructions of the dynamics and succession of changes in vegetation and climate are mostly based on the analysis of widely separated stratotypes and parastratotypes of interglacial horizons, rather than single sections containing information on the continuous evolution of Pleistocene environments. For that reason, we based our periodization and correlation of Pleistocene paleogeographical events on a detailed palynological study of reference sections of the loess-paleosol formation, which, in terms of completeness of paleoclimatic record reflected by it, is comparable to deep-sea sediments and can be used as a reliable basis for the reconstruction and correlation of global climatic rhythms.

At present, various versions of correlating the principal stages of LPF evolution with stratigraphic subdivisions of the oxygen isotope scale of deep marine and oceanic sediments have been developed (Pecsi, 1993; Veklich, 1995; etc.). However, they cannot be accepted without certain reservations. The survey of scholarship reveals that due to the lack of representative pollen data nearly all modern researchers firmly adhere to an erroneous belief that throughout Eurasia loesses correspond to glacials and paleosols to interglacials or interstadials (Veklich, 1982; Velichko et al., 1984, 1989; Kukla, 1987; Maruszczak, 1986; Pecsi, 1993; Dodonov, 2001). This view is disproved by the results of paleobotanical, microtheriological, and palynological analyses of loess-paleosol sections (Pashkevich, 1977; Bolikhovskaya, 1982, 1987, 1993, 1995; Velichko, Morozova, 1982; Markova, 1982).

Based on extensive original and literary data incorporating the results of palynological and complex analyses of Pleistocene sections representing various natural historical regions, their climato-stratigraphic subdivision was carried out, and detailed landscape-climatic and lithofacial reconstructions were made, providing a possibility to trace the successions of flora and climate within each warm and cool stage over the past 800 ka (Bolikhovskaya, 1995, 1996). Thanks to these studies, it became possible to specify relationships between lithostratigraphic and climatostratigraphic subdivisions of LPF. It became evident that borders between loesses and paleosols do not necessarily coincide with borders of glacial and interglacial climatic rhythms; that the paleosol may correspond to just one stage of the interglacial rhythm rather than to the entire interglacial; and that loess or a loess-like substance may have formed during endothermal coolings within the interglacials (or during the thermoxerotic stages of interglacials in the southernmost loess regions) rather than under the glacial climate alone. The idea that loess is a solely glacial formation holds for the central East European Plain only, according to Likhvin (the Upper Oka), and Strelitsa (the Upper Don) sections. Palynospectra of Arapovichi, the Middle Desna, Molodova, the Middle Dniester, Otkaznoe, the Middle Kuma, etc., demonstrate that the accumulation of loess horizons in the southern East European Plain occurred not only during the glacials, but during the thermoxerotic stages and endothermal coolings within the interglacials as well. Paleosols formed here during the interglacials and interstadials as well as during the cryohygrotic stages of glacials.

The integration of results of a detailed palynological analysis and those of comprehensive research into reference sections of the glacial-periglacial and extraglacial zones has enabled Bolikhovskaya (1995), who accepted the inter-regional scale of the East European Platform and the scheme elaborated at the Institute of Geology (IG) of the Russian Academy of Sciences (Moscow) as a basis, to carry out a detailed climatostratigraphic subdivision of LPF, specify regional stratigraphic schemes for certain loess regions as well as interglacial and glacial climatic rhythms within the Brunhes chron, and assess the correct position of the Matuyama-Brunhes paleomagnetic reversal on the climatostratigraphic scale of the Pleistocene.

It was demonstrated that environmental changes on the East European Plain in the Pleistocene were caused by the successions of 17 global climatic events: nine interglacials separated by eight glacials or coolings having a glacial rank (Table 1). Fourteen successive interglacial and glacial stages in the formation of loess, loess-like deposits, paleosols, and paragenetically related glacial, alluvial, lacustrine, and other deposits within the Middle Pleistocene, were shown to be correlated with glacial and interglacial paleogeographical events of the West European schemes: Petropavlovka interglacial (Interglacial I, Waardenburgian, Osterholzian), Pokrovka cooling (Glacial A), Gremyachie interglacial (Early Il'inka, Interglacial II, Westerhovenian, Harreskovian), Devitsa cooling (Middle Il'inka, Glacial B, Unstrutian), Semiluki interglacial (Late Il'inka, Interglacial III, Rosmalen, Arternian), Don glacial (Glacial C), Muchkap interglacial (Belovezhsk, Interglacial IV, Noordbergumian, Voigtstedtian), Oka glacial (Elsterian), Likhvin *s. str* interglacial (Holsteinian), Kaluga cooling (Borisoglebsk, Fuhne), Chekalin interglacial (Kamenka, Dõmnitzian), Zhizdra glacial (Orchik, Drenthe), Cherepet interglacial (Romny, Drenthe/Warthe), and Dnieper glacial (Saalian). Mikulino interglacial (Eemian), and Valdai glacial (Weichselian), the latter consisting of at least 19 warmings and coolings of an interstadial/stadial rank, and the ongoing Holocene interglacial are the main stages in the evolution of landscapes and climate of the loess regions during the Late Pleistocene and Holocene. Due to the absence of representative paleobotanical characteristics that would support the limits of the reconstructed interglacial and glacial epochs in the stratotypes of Borisoglebsk, Kamenka, Orchik, and Romny horizons, according to IG scheme, or strata of the loess-paleosol formation characterizing the subdivisions within Il'inka, synchronous stages were named after the sections where they were revealed not only by a complex analysis but also by means of a detailed palynological characteristics which made it possible to specify these limits.

A comparative analysis of climatic rhythmics reconstructed on the basis of pollen data and the results of paleomagnetic studies carried out in various parts of the Eastern European loess province indicate that the Brunhes chron encompasses eight interglacials separated by seven glacial periods. A reconstruction of a continuous succession of interglacial and glacial events has made it possible to specify the position of the Matuyama-Brunhes reversal within the system of Pleistocene climatic rhythms: it is situated between the eighth interglacial and eighth glacial, counting from the present. In Strelitsa, Otkaznoe, Liventsovka, and Margaritovka sections (the last two are in the northeastern Azov region) the Matuyama-Brunhes reversal marks the transition from Pokrovka glacial to Gremyachie interglacial horizon.

Reconstruction of paleoclimatic events

The most important paleogeographical events reconstructed by means of the palynological analysis of Pleistocene deposits of the East European Plain include global climatic fluctuations manifested in successions of interglacial and glacial rhythms, and regional environmental changes induced by them: floristic and phytocoenotic successions, transgressive and regressive fluctuations of the level of marginal and inland sea basins, change of facial conditions of the continental sedimentation resulting in the formation of till horizons in the glacial zone, and in lithological phenomena such as loesses and thick paleosol complexes in the glacial-periglacial and extraglacial zones. In the present article, chronostratigraphic schemes and thorough correlations of reconstructed paleoclimatic events are supported by the results of climatostratigraphic subdivision of Pleistocene deposits of the southern part of the East European Plain based on their detailed palynological and complex paleogeographical study and by the ESR determination of the absolute age of fauna-bearing deposits of uplifted marine horizons as well as other geological formations associated with climatic warming.

Table 1. Comparison of stratigraphic subdivisions of periodization schemes for loesses and paleosols of the East European Plain

		Horizons and subhorizons of interregional scale (1996)	Paleomagnetism	Stages of evolution of loess-paleosoil formation (Bolikhovskaya, 1995)		MIS	Periodization of loess and paleosoils (Velichko et al., 1989)	MIS	Stratigraphy of Quaternary of the Ukraine (Veklich, 1995)	MIS
Pleistocene	Late	Holocene		**Holocene interglacial**	IV	1	**Holocene soil**	1	**Holocene**	1
		Valdai glacial horizon		Valdai glacial	III v	4-2	Altynovo l., Trubchevsk s., Desna l., Bryansk s., Khotylevo l., Krutitsa s., Sevsk l.	4-2	Prichernomorsk, **Dofinovka,** Bug	2 3 4
		Mikulino interglglacial horizon		**Mikulino interglacial**	III mk	5	**Salyn soil**	5	**Vitachev,** Udaj, Tyasmin, **Kajdaki** **Priluki,**	5 6 7
	Middle	Central Russian glacial horizon		Dnieper glacial	II dn	6	Mertsalovka loess **Kursk soil** Tsna loess	6	Dnieper	8
		Likhvin interglglacial superhorizon		**Cherepet' interglacial**	II chr	7	**Romny soil**	7	**Zavadovka**	9 10 11
				Zhizdra interglacial	II zh	8	Orchik loess			
				Chekalin interglacial	II ch	9	**Kamenka soil**	8		
				Kaluga glacial	II kl	10	Borisoglebsk loess	9 10	Tiligul	12
				Likhvin interglacial	II l *ss*	11	**Inzhavino soil**	11	**Lubny**	17-11
		Oka glacial horizon		Oka glacial	I ok	14-12	Korostylevo loess	12	Sula	18
		Belovezhsk interglglacial horizon		**Muchkap interglacial**	I mch (=bv)	15	**Vorona soil**	13 14 15	**Martonosha**	23-19
		Don glacial horizon		Don glacial	I dns	16	Don loess	16	Priazov	24
		Il'inka interglglacial superhorizon		**Semiluki (Late Il'inka) interglacial**	I sm	17	**Rzhaksa soil**	17 18	**Shirokino**	25
				Devitsa (Middle Il'inka) glacial	I dv	18				
				Gremyachie (Early Il'inka) interglacial	I gr	19				
		Pokrovka glacial horizon	Matuyama/Brunhes	Pokrovka glacial	I pk	20	Bobrov loess	19	Il'ichevsk (?)	
		Petropavlovka interglglacial horizon		**Petropavlovka interglacial**	I pp	21	**Balashov soil**	20	**Kryzhanovka (?)**	

In the East European Plain, like in other continental regions of North Eurasia, climatostratigraphic schemes for the earliest stage of the Pleistocene are the most controversial. Specifically, while the Oka-Don region is the best studied using the entire set of paleogeographical techniques, the subdivision of deposits underlying the Don glacial till is far from complete. This is evidenced by discrepancies between the researchers' views regarding the structure and age of subaerial formations underlying the till in the Upper Don basin (Velichko et al., 1984; Krasnenkov et al., 1993; etc.). The main reason for the controversy is the impossibility to assess the climatostratigraphic rank of each loess and paleosol horizons as well as the borders of estimated climatochrons based on lithofacial features of deposits and numerous but scattered faunal data alone. These paleoclimatic reconstructions were hampered by the absence of stratum-by-stratum palynological characteristics for most sections in which paleofaunal remains were found and the Matuyama-Brunhes reversal, dated at 780 ka, was pinpointed. To make up for this blank, a comprehensive study of Otkaznoe, Strelitsa and Lower Don sections had to be undertaken.

Petropavlovka interglacial and Pokrovka cooling. Landscape-climatic conditions of these intervals were reconstructed by us using the results of a complex analysis of deposits of Liventsovka section on the right bank of the Don near the western fringes of Rostov-na-Donu (Razrez..., 1976). Here, the Sarmatian limestones underlie the Pliocene alluvial-delta deposits which, according to V.I. Gromov, A.K. Agadjanian, L.I. Alekseeva, V.S. Baygusheva, and others, contain remains of large mammals of the Khapry faunal assemblage and late Khapry small mammal fauna. Above, there are Early Pleistocene alluvial sediments and Early Pleistocene – Early Middle Pleistocene gray Scythian clays with two horizons of red-brown paleosols. The upper part of the section consists of loess-like loams overlaid by the modern chernozem. Nearly all strata have a reverse magnetization. The Matuyama-Brunhes reversal was discovered by E.I. Virina and S.S. Faustov in the upper part of the red-colored soil overlying the Scythian clays at the depth of 1.6 m. Using the results of the palynological analysis carried out by M.P. Grichuk and G.M. Shumova, we performed a climatostratigraphic subdivision of the section.

During the *Petropavlovka thermochron*, the lower red-colored soil formed as well the lower part of the overlying gray Scythian clays. The principal role in the automorphous landscapes of the Lower Don at that time was played by elm, hornbeam, and oak woodland, whereas less favorable habitats were occupied by pine, cedar, fir, spruce, and birch forests. During the *Pokrovka cooling*, periglacial steppes dominated most East European loess regions. In the Liventsovka section, this is reflected in palynospectra of the upper part of the gray clays and horizon B of the upper red-colored soil, suggesting that in the Upper Don area, this was the time when the predominant landscapes were periglacial tundras and forest-steppes with mostly dwarf birch woodlands that included *Betula fruticosa*, *Alnaster fruticosus*, and *Salix sp.*, as well as coniferous-birch open woodlands and steppe biotopes.

Il'inka period. The climatic rhythmics of the Il'inka horizon of the inter-regional scale, according to palynological data, correspond to two interglacials separated by a cooling. In most loess regions of East Europe, the predominant landscape during these interglacials was forest-steppe with an arid summer and a moist winter. A long and complex Il'inka interval (ca 780 – 660 ka) was characterized in detail based on sections in the Upper Don and Middle Kuma basins. In Strelitsa, it corresponds to a loess-paleosol series overlying the red-colored soils of Early Pleistocene and underlying the till. It is represented by two paleosols separated by a loess-like sandy loam. The lower soil of this series formed during the *Gremyachie (Early Il'inka) period* in the interglacial steppes and forest steppes. During the *Devitsa (Middle Il'inka) cooling*, a loess-like horizon separating the soils formed, as well as the parent rock of the alluvial horizon B and the lower strata of humus-accumulative horizon A1 of the upper soil. The larger part of the thick humic horizon of the upper soil, the roof of which was cut off probably by the Don till, formed during the *Semiluki (Late Il'inka) thermochron*.

The Don glacial period. At Strelitsa, the Upper Don basin, the Don glacial assemblage is represented by the following horizons, listed from bottom to top: grayish-black till, gray and yellowish-brown sands, grayish-green and brick-red till, and fluvioglacial sands. The accumulation of most sands separating the tills occurred in the periglacial tundras. Periglacial-steppe coenoses reconstructed for the sedimentation period of the lower part of these sands reflect the vegetation of the Middle Don interstadial. In Likhvin, during the Don cryochron, lacustrine-glacial sediments were accumulating, evidenced by the predominance of cryophytes in pollen spectra.

The Don glacial (ca 660 – 610 ka) we associated with the oxygene-isotope stage (OIS) 16. During its climatic pessimum, periglacial tundras and forest-tundras dominated in the glacial-periglacial zone in the Upper Oka and Upper Don drainage basins, periglacial forest-steppes and steppes spread over extraglacial areas of the Dnieper Lowland; and open coniferous and birch forests with cold-tolerant dwarf shrubs (*yernik*) occupied the East Caucasian piedmonts (Bolikhovskaya, 1995).

Muchkap (Belovezhsk) interglacial. Based on ESR data, the formation of this global warming dates to 610 – 535 ka. Using fauna-bearing marine sediments of that period, ESR-dates were obtained on shell sample from the Novosibirsk Islands and Severnaya Zemlya in the Arctic (555 – 550 ka) (Molodkov et al., 1992), and on the Taymyr Peninsula (535.5 ka) (Bolshiyanov, Molodkov, 1999). With regard to the reconstruction of paleoclimate and the periodization of the final Early Middle Pleistocene, chronostratigraphic studies of Treugol'naya Cave in the North Caucasus, the most ancient Early Acheulean cave-site in the Russian Federation, discovered in 1986 by L V. Golovanova and V.B. Doronichev, are highly important (Molodkov, 2001).

The cave is situated on the northern slope of the Greater Caucasus, in the Urup River basin at approximately 43°54' North 41°12' East at an absolute height of ca 1510 m above sea level in the zone of a periodical development of mountain-valley glaciations, as evidenced by the lithostratigraphy of the cave and by the alternation of cultural levels with sterile ones. The latter may be indicative of the time when man left the cave shelter. It might have been due to a remarkable cooling of the climate during which the mountain glaciation developed and the altitude of the snow line fell well below the cave bottom.

The deposits of the cave reference section (Fig. 3) are divided into 14 lithological layers some of which can be further subdivided. According to faunal, lithological, and archaeological data, the cave deposits cover the time span from the Günz-Mindel (layers 7 and 6) to the Holocene (layers 2 and 1). All stratigraphic levels of the cave formed during the Brunhes chron (Pospelova et al., 1996) and therefore should not be older than 780 ka. Layers 7a, 5a, 5b, 4a, and 4b contain Early Acheulean stone industries, layers 7b and 6 are archaeologically sterile, and layer 8 is the bottom of the cave (Doronichev, 1991). Cultural layers 7a and 5b were dated with the ESR method using the abundant samples of land mollusk remains. The mean age of layer 7a is 583 ± 25 ka, and that of 5b, 393 ± 27 ka (Molodkov, 2001), making it possible to relate the first cultural layer of the cave and the first appearance of Acheulean man in it to the beginning of the "warm" stage 15. It is quite likely that humans crossed the Greater Caucasian range at approximately the same time, when the total area of mountain glaciers decreased considerably. Layer 6, which is archaeologically sterile, could have formed around 500 ka, when, following the advance of glaciers, considerable downward shift of mountain landscape belts, and a dramatic decrease of territories suitable for human settlement, ancient people moved to piedmont valleys and southern regions of the East European Plain. The subsequent improvement of climate and the shift to the interglacial environment may have resulted in further migration of man into the plain. This is evidenced by finds from the Early Acheulean sites in the Lower Don area (Mikhajlovskoe, Khryashchi) and in the northern Azov coast (Gerasimovka): lithic tools accompanied by remains of mammals of the Tiraspol fauna complex and mollusks of the Baku period (Paleolit..., 1984).

According to palynological evidence, during the climatic optimum of the Muchkap interglacial, most of the East European loess province was dominated by coniferous-deciduous forests with some Neogene exotes, and the Caucasian piedmonts were mostly covered by polydominant broad-leaved forests consisting of *Carpinus*, *Fagus*, *Carya*, *Pterocarya*, *Liquidambar*, *Juglans*, *Castanea*, and other heat- and hydrophilous species (Bolikhovskaya, 1995). The most complete succession of vegetation typical of the Muchkap (Belovezhsk) interglacial is present in sections studied in the Upper Don and the Middle Kuma basins. In Strelitsa, at that time, the Vorona pedocomplex (PC) formed on the till (its horizon A1' is an exception). During most of the interglacial, forest vegetation predominated, specifically birch-pine forests with spruce, oak, elm, and zelkova during *Bv1*; polydominant dark-coniferous broad-leaved forests consisting of fir, spruce (including *s. Omorica*), and *s.s. Cembra* and *Strobus*, stone oak, common and Caucasian hornbeam, nut, broad-leaved linden, etc., during *Bv2* (maximal heat and moisture supply); pine-birch and oak-hornbeam forests during *Bv3*; birch and spruce-pine forests during the endothermal cooling of *Bv4*; birch forests with pine, linden, etc. during *Bv5*; spruce-pine-birch and hornbeam-oak forests during *Bv6*; and forest-steppes with patches of spruce-pine and birch forests during *Bv7*. In the Likhvin section, there are no deposits dating from the early or final phases of the interglacial. This section is represented by lacustrine sediments corresponding to the optimal phases separated by an endothermal cooling. This succession is marked by a change in the proportion of coniferous and coniferous-broad-leaved forests that dominated the Upper Oka region (Fig. 4). Climatic and floristic peculiarity of the period is reflected by the proportion of both typical plants such as *Tsuga canadensis*, *Picea s. Omorica*, *P. s. Eupicea*, *Abies sp.*, *Pinus s. Cembra*, *P. s. Strobus*, *Larix sp.*, *cf. Rhus sp.*, *Carpinus betulus*, *C. orientalis*, *Fagus sylvatica*, *Quercus robur*,

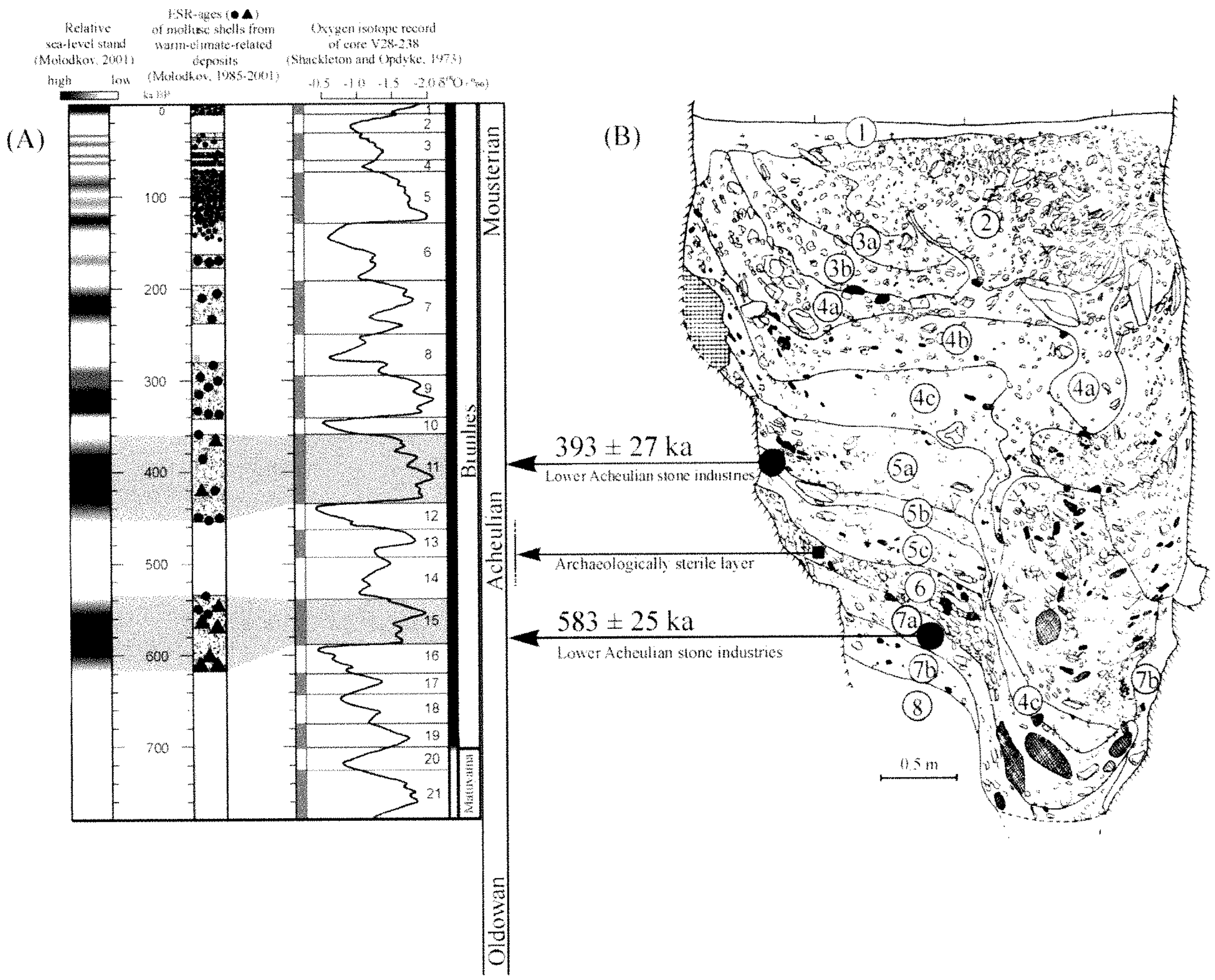

(A)
Relative sea-level stand (Molodkov, 2001)
high
low
ESR-ages (●▲) of mollusc shells from warm-climate-related deposits (Molodkov, 1985-2001)
ka BP
Oxygen isotope record of core V28-238 (Shackleton and Opdyke, 1973)
-0.5 -1.0 -1.5 -2.0 δ¹⁸O (‰)
0
100
200
300
400
500
600
700
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
Brunhes
Matuyama
Mousterian
Acheulian
Oldowan
(B)
393 ± 27 ka
Lower Acheulian stone industries
Archaeologically sterile layer
583 ± 25 ka
Lower Acheulian stone industries
①
②
3a
3b
4a
4b
4c
5a
5b
5c
⑥
7a
7b
⑧
0.5 m

Fig. 3. ESR-ages of Treugol'naya Cave culture-bearing layers 7a and 5b (▲) and its correlation with oxygen-isotope record and ESR-ages of raised marine and lacustrine deposits (●) (A). Stratigraphy of Treugol'naya Cave deposits after V.B. Doronichev (personal communication, 1991) (B).

Q. pubescens, *Tilia platyphyllos*, *T. cordata*, *Ilex aquifolium*, *Ulmus laevis*, *U. glabra*, *U. campestris*, *Osmunda cinnamomea*, *O. claytoniana*, etc.) and exotic taxa including *Cedrus sp.* (introduced from afar), *Tilia amurensis*, *Osmunda regalis*, *Woodsia manchuriensis*, and *W. fragilis*.

The Oka glacial. On the Upper Oka, the Oka till, up to 5-m-thick, is seen in outcrops along the Likhvinka stream and near the village of Bryan'kovo. On the Upper Don, periglacial landscapes representing the Oka cold stage (ca 535 – 455 ka) were tundra-steppes and tundra-forest-steppes. At that time, periglacial steppes existed in the extraglacial areas of the Dnieper basin, and periglacial forest-steppes in the East Caucasian piedmonts.

Likhvin s. str. interglacial. Its chronological range is about 455 to 360 ka. Most ESR dates are derived from transgressive sediments of Arctic Seas (Molodkov et al., 1992) and from a complex analysis of lake-and-bog deposits of the Butėnai interglacial in Lithuania (Gaigalas, Molodkov, 1993). Culture-bearing layer 5 in Treugol'naya Cave falls in the same interval (Molodkov, 2001).

In the stratotype of this interglacial (the Likhvin section) a detailed analysis of the entire 20-meter-thick suite of lacustrine, bog, and alluvial deposits representing Likhvin *s. str.* interstadial was performed by us. The typical interglacial taxa are representatives of the European Mediterranean, East Asian, and North American flora: *Larix sp.*, *Abies alba*, *Picea s. Omorica*, *P. excelsa*, *Pinus s. Cembra*, *P. s. Strobus*, *P. sylvestris*, *Betula s. Costatae*, *B. pendula*, *B. pubescens*, *Juglans regia*, *Carpinus betulus*, *Fagus sylvatica*, *Quercus petraea*, *Q. robur*, *Q. pubescens*, *Zelkova sp* , *Celtis sp* , *Ulmus propinqua*, *U. laevis*, *U. campestris*, *Fraxinus sp.*, *Tilia platyphyllos*, *T. tomentosa*, *T. cordata*, *Acer sp.*, *Corylus colurna*, *C. avellana*, *Alnus glutinosa*, *A. incana*, *Ligustrina amurensis*, *Rhododendron sp* , *Vitis sp.*, *Myrica sp.*, *Osmunda cinnamomea*, *Salvinia natans*, etc., including characteristic species such as *Tsuga canadensis*, *Taxus baccata*, *Pterocarya fraxinifolia*, *Juglans cinerea*, *Castanea sativa*, *Ilex aquifolium*, *Fagus orientalis*, *Quercus castaneifolia*, *Buxus sp.*, *Osmunda claytoniana*, etc. The predominant landscapes during the climatic optimum of the Likhvin thermochron in Central Eastern Europe were initially oak-hornbeam and then spruce-fir and hornbeam-beech-oak forests. During the thermoxerotic maximum coinciding with the first half of the interglacial, grasses and other herbaceous steppes dominated the respective zones of the loess regions in the East European Plain. The thermohygrotic maximum registered in the second half of the interglacial was characterized by a wide expansion of thermo- and hydrophilous taxa such as *Tsuga*, *Pterocarya fraxinifolia*, *Juglans regia*, *Fagus orientalis*, *F sylvatica*, *Carpinus betulus*, etc. into the forest and forest-steppes that were widely distributed at that time (the last in the southwest).

The warmest interglacial stage over the past 600 ka, Likhvin, corresponding to OIS 11, was associated with the highest sea level stand recorded at ca +20 m above MSL (Howard, 1997; Rohling et al., 1998). From this stratigraphic level and upward the warm-climate-related signals recognised by us show correlation with the time of formation of sapropel horizons (Sap11 – Sap1) (Rossignol-Strick et al., 1998) in the eastern Mediterranean (see Fig 4): clearly, these coincide with periods of global improvement of climate and with the recently published data (Rohling et al., 1998) concerning the global sea-level stands over the past 500 ka.

Kaluga cooling. In this interval (ca 360 – 340 ka), lacustrine and alluvial deposits, the overlying soil PS7, and the parent rock of PS6 soil having a postcryogenic texture formed in the Likhvin section (Bolikhovskaya, 1995). During the coldest phases of the Kaluga cooling, coinciding with stage 10 of the oxygen-isotope scale, the Upper Oka and the Upper Don basins were covered with periglacial tundras and forest-tundras with patches of tundra-forest-steppes and tundra-steppes, and in the southern part of the extraglacial zone of the East European Plain the predominant landscapes were periglacial forest-steppes and steppes.

Chekalin interglacial. The Eastern European loess areas studied were covered by forest and forest-steppe vegetation characterized by a radical drop in the number of Pliocene exotes compared with the preceding interglacials. The paleoclimatic signal of interglacial character, observed in various environments, falls, according to our data, in the 340 – 280 ka range (OIS 9 and early part of OIS 8). This is the date of the later horizons of lacustrine sediments attributed to the second sedimentation interval of the Butēnai interglacial in Lithuania (Gaigalas, Molodkov, 1993, 1997) and the marine sediments of the Taymyr – Severnaya Zemlya region (Molodkov, 1995, Molodkov et al., 1992; Bolshiyanov, Molodkov, 1999). Correlated formations are clearly seen in the Likhvin section as a well-expressed paleosol complex (reddish soil PS5 and podzol PS6) that developed in the forest landscapes (see Fig. 4). During the time of optimal heat- and moisture supply, the Upper Oka basin was mainly occupied by spruce-linden-elm-oak forests.

Zhizdra cooling. This cooling correlates with the larger part of oxygen isotope stage 8. In the East European loess province, it resulted in the predominance of periglacial tundras, forest-tundras, and steppes in the northern periglacial regions, and the cryo-arid landscapes of the eastern Caucasian piedmonts were predominated by open birch woodlands and yernik formations. The species composition of the periglacial forest-tundra that dominated the Upper Oka basin resembled that of the preceding Kaluga cryochron represented by *Larix sp.*, *Pinus sylvestris*, *Betula pubescens*, *B. pendula*, *B. fruticosa*, *B nana*, *Alnaster fruticosus*, *Dryas octapetala*, *Selaginella sibirica*, *Lycopodium appressum*, *L. pungens*, *Artemisia s.g. Seriphidium*, *Thalictrum sp.*, etc., differing from it by a lesser diversity of cryophytes.

Cherepet interglacial. A significant warming in a rank of interglacial, predating penultimate glaciation (OIS 6), is established by ESR data in the time interval about 220 ka (OIS 7) on the transgressive marine deposits. Throughout the loess regions of the East European Plain, the predominant forests during this period were those with a considerable proportion of xerophytic-broad-leaved formations consisting of *Carpinus orientalis*, *Ostrya sp.*, *O. carpinifolia*, etc. In the Likhvin section, the Cherepet' warming is correlated with the boggy-gley soil PS4 (see Fig. 4). During the most optimal phases of vegetation development, hornbeam-oak and cedar-broad-leaved formations dominated the Upper Oka region.

The Dnieper glacial. In Likhvin, the Dnieper stage *s. lato* (ca 200 to 145 ka), corresponding to greater part of the oxygen-isotope stage 6, is represented by a long suite consisting of (1) Early Dnieper fluvio-glacial aleurites with a lemming fauna (*Dicrostonyx cf simplicior*, *Lemmus sibiricus*, etc.) (Agadjanian,

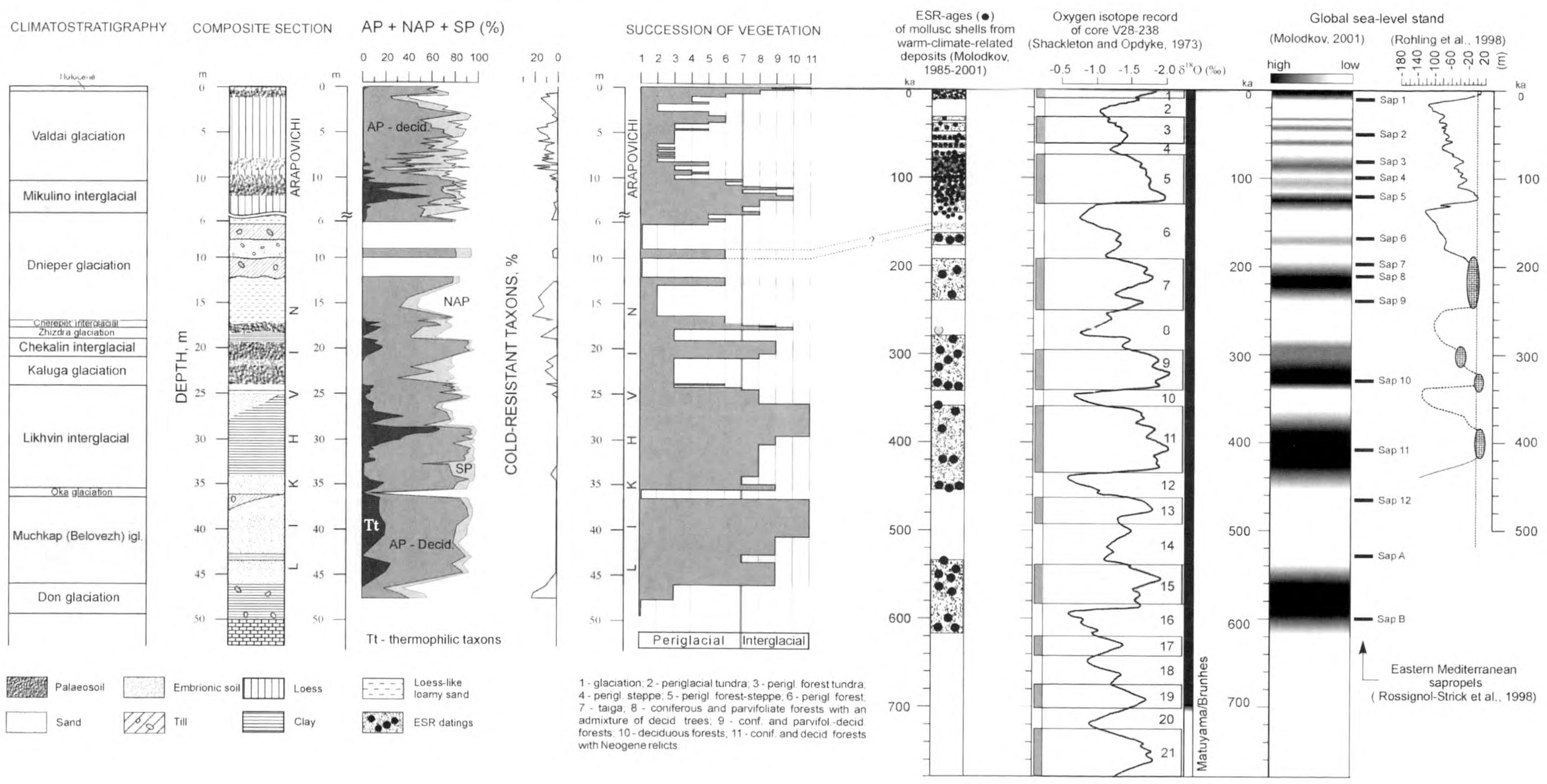

Palaeoenvironmental successions reconstructed in the Arapovichi and Likhvin sections by pollen analysis (Bolikhovskaya, 1995 - 1999)

Fig. 4. Chronology and correlation of the main paleogeographic events over the past 600 ka.

1971) and mostly tundra-steppe pollen spectra; (2) three-layered till corresponding to the Dnieper and Moscow stadials and the Dnieper-Moscow interstadial with the predominance of open pine woodland, and alder and yernik thickets; and (3) Late Moscow loess-like sandy loam. During the Early Dnieper interstadial, traced in the upper part of the aleurites underlying the till, periglacial pine open woodlands predominated. The Late Moscow interstadial warming is represented in ferrous sands overlying the till by a phase of periglacial birch open woodlands with *Betula fruticosa* in the shrub belt and a grass-and-shrub vegetation with *Arctous alpina, Cannabis sp., Artemisia s.g. Seriphidium, Thalictrum cf. alpinum,* etc. Judging by the totality of pollen data, periglacial landscapes of the Upper Oka and Upper Dnieper during the interstadials of the Dnieper period were tundra-steppes stretching further east into the Upper Don valley where they alternated with periglacial forest-tundras and tundra-forest-steppes. In extraglacial loess regions periglacial steppes and forest-steppes predominated at that time, and in the extreme southeast, they intermixed with periglacial semideserts during certain phases.

Mikulino interglacial and Valdai glacial. Late Pleistocene deposits are characterized by analytical data in much greater detail than they are for other sediments. To trace the climatic rhythmics of the past 200 ka, Bolikhovskaya generalized the results of a complex analysis of more than 40 Dnieper – Late Pleistocene sections in the southern half of the East European Plain and compiled detailed schemes of their climatostratigraphic subdivision, landscape-climatic fluctuations and zonal types of periglacial and interglacial vegetation for each reconstructed stage. These results will be outlined in detail in a forthcoming publication. For our present purposes, it will suffice to mention that within the Valdai glacial climatic rhythm, dated by us to 70 – 10 ka (OIS 4 – 2), three Early Valdai, three Middle Valdai, and three Late Valdai interstadials, as well as ten cold stadials were reconstructed. Each of these has its own floral, phytocoenotic, and climatic characteristics (Bolikhovskaya, 1987, 1993, 1995, etc.).

The Mikulino (*s. lato*) interglacial, which we correlate with OIS 5, had a complex climatic structure as well (Bolikhovskaya, 2000). Before the mid-1960s, most researchers correlated stage 5, too, with Mikulino (Eemian) interglacial (pollen zones M_2 – M_8 (Grichuk, 1961, 1989, etc.)), that had lasted for ca 50 ka (Velichko, 1982). However, after the publications of Shackleton (1969) and then Mangerud et al. (1979), more and more researchers began to correlate the latter interglacial with substage 5e alone, ca 10 ka in duration (Müller, 1974). The chronology of the interglacial flora characterized by pollen zones M_2 – M_8 was revised accordingly. Substages 5d – 5a began to be viewed as the early stage of the Valdai (Weichsel) glacial (Mangerud et al., 1979). Many researchers believe that during the coldest intervals 5d and 5b significant glacier advance occurred often hundreds of kilometers from glaciation centers. The sea level, judging by the increase in the proportion of "heavy" oxygen isotopes, was 55 – 60 m below the modern one (Shackleton, 1987). Huge territories that had been submerged by the Boreal Sea in the Eurasian north, became dry land, that should have affected the marine sedimentation in the coastal areas.

However, recent ESR-chronostratigraphic analyses of mollusk shells from marine sediments of Northern Eurasia (Molodkov, 1988, 1995; Molodkov et al., 1992; Bolshiyanov, Molodkov, 1999; Molodkov, Raukas, 1998) and paleolacustrine sediments in Lithuania (Gaigalas, Molodkov, 1993, 1997), suggest that the sea transgression and the accumulation of lacustrine interglacial sediments in this region likely falls in the 145 – 70 ka interval, corresponding to the entire OIS 5 and to the final phase of OIS 6 (see Fig. 4).

The time-dependent frequency distribution of all the ESR-dates obtained by us for the last interglacial mostly on uplifted marine sediments along the marginal zone of the North Eurasia demonstrates the presence of high-frequency intervals (peaks I – V; Fig. 5) at ca 135, 120, 110, 90, and 70 ka, which may be correlated with periods of a relatively warm climate and the submergence of coastal parts of the land. Low-frequency intervals (troughs b – e; Fig. 5) at 130, 115, 100 and 75 ka may be correlated with coolings and phases of sea regression.

Our findings concerning the frequency distribution of ESR-dates for northern Eurasia are in good agreement with the results of isotope and chronological analyses of speleothems from the caves of Stordalsgrotta and Okshola northern Norway (Fig. 5). A continuous growth of speleothems in the interval of 150 – 71 ka, indicates the absence of thick ice cover (i.e., interstadial or glacial conditions) at that time (Lauritzen, 1995). Periods of cooling which, however, did not result in a considerable growth of the Scandinavian glaciation or the emergence of an ice sheet in the coastal zone of northern Norway in the vicinity of the caves, were registered here at ca 145, 139, 129, 114, and 100 ka (according to U-series dating). Although the cold interval at 75 ka has not been revealed in these caves, its isotope temperature signal is clearly visible in speleothems from caves in northwestern Romania (Lauritzen, Onac, 1999). Also, in the series of sections from the eastern coast of the White Sea studied by us (Molodkov, Raukas, 1998) there is no interruption of marine sedimentation during the 120 – 75.5 ka interval; neither were any deposits suggestive of glaciation revealed for that period.

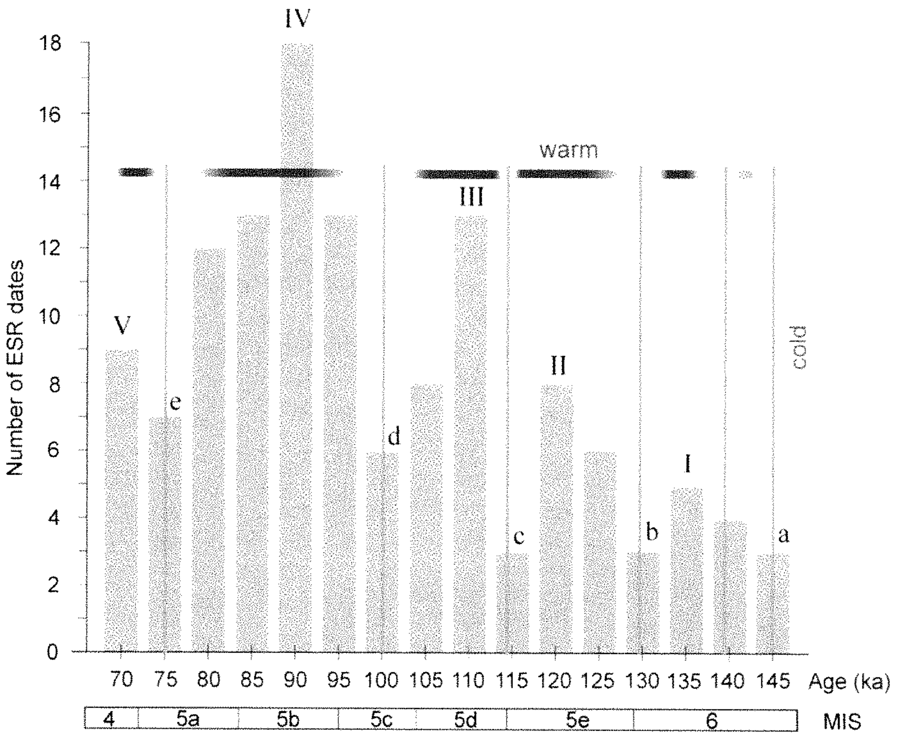


Fig. 5. Frequency distribution of ESR-ages between 145 and 70 ka (Molodkov, 1985 – 2001) and phases of relatively warm and cool climate (after (Lauritzen, 1995; Lauritzen, Onac, 1999)).

All the above observations attest to a higher sea level, greater duration of the first Late Pleistocene transgression and, possibly, of the interglacial period than it would follow from the oxygen isotope curve or from the correlation of the Mikulino (Eemian) interglacial with substage 5e alone. Also, our findings agree with the recent results of multidisciplinary studies in the Western Hemisphere; the data indicate that full interglacial conditions there span a time interval comparable with the entire stage 5 (Bischoff et al., 1997).

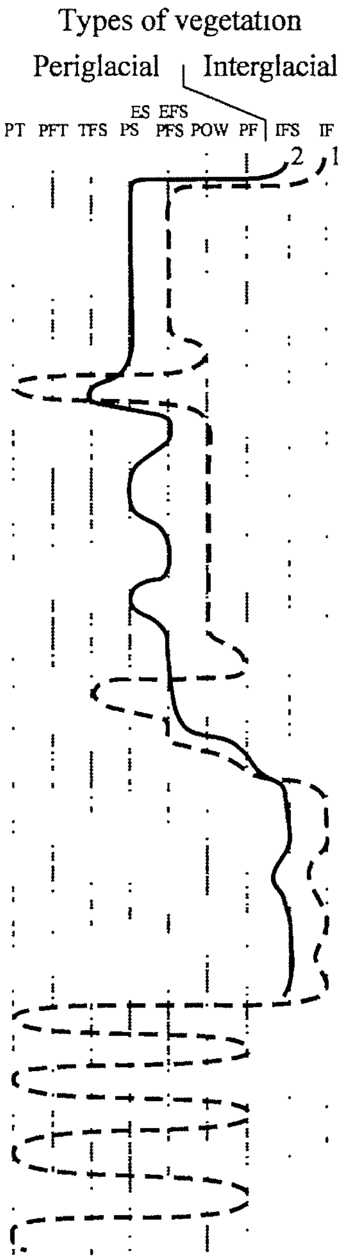
Results of a detailed pollen analysis of loess-paleosol and other continental deposits that formed during the post-Dnieper (post-Moscow) period do not contradict these conclusions.

In the central regions of East Europe, now situated in the mixed forest subzone, the richest water supply during the Late Pleistocene was characteristic of the interval from the beginning of the Mikulino interglacial up to the end of the first Early Valdai (Ketrosy) interstadial, and in the southwestern parts, now occupied by broad-leaved forests, up to the end of the second Early Valdai (Kishlyansky) interstadial (Table 2). A complex pattern of change of the Mikulino vegetation, a distinct climatic subdivision of this interglacial, and the presence within it of several coolings (or endothermals after Bolikhovskaya (1991)) which are distinctly correlated with coolings at ca 107 and 90 ka, registered in La Grande Pile section, France (Kukla et al., 1997), suggest that the Mikulino interglacial was a long one. The comparison of floristic, phytocoenotic, and climatic successions of the Mikulino period (reconstructed according to LPF sections) and Holocene, too, clearly demonstrate that the Mikulino thermochron was several times longer than is the modern interglacial that has lasted just 10 ka.

The above can be illustrated by materials from the Arapovichi section in the northeastern Dnieper Lowland. Here, the Dnieper till is overlain by 14-meter-thick Late Pleistocene loesses and paleosols (see Fig. 4). According to the palynological analysis, sands and loams overlying the till and most of the Mezin paleosols overlying them (Salyn lessive and the lower third of the sod-chernozem Krutitsa soil) are dated as the Mikulino interglacial in age. The Ketrosy interstadial was registered in the middle of this soil. Over the entire Mikulino period, under relatively high heat and moisture supply, most of this territory was covered by forests. Climato-phytocoenotic and floral features of Mikulino interglacial forests fall into 11 successive stages: *Mk1* – pine-birch forests with oak,

Table 2. Reconstruction of principal stages of the evolution of vegetation and climate in the East European Plain over the past 200 ka based on sections of modern subzones of mixed and broad-leaved forests

Absolute age, ka	Stages			Kishlyanski Yar Ketrosy	Molodova I V	Arapovichi	Chekalin (Likhvin)
	Holocene			IFS	IFS		IF
10.0	Valdai glacial	Late Valdai	Late Dryas	PS	PS		
10.8			Allerœd	ES	ES		
11.8			Middle Dryas	PS	PS		
12.0			Bølling	ES	ES		
12.4			Early Dryas	PS	PS	PS	PFS
13.2			Interstadial	ES	ES	PFT	POW
17.0			Korman stadial	TFS	TFS	PT	PT
23.0		Middle Valdai	Dnester stadial	EFS	EFS	PFT	POW
			Stadial	PFS	PFS	PT	
			Molodova interstadial	ES	EFS	PFS	
			Stadial	PS	PFS	PFS	
			Bailov interstadial	EFS	EFS	PFS	POW
			Stadial	PFS	PFS	PS	
50.0		Early Valdai	Interstadial	ES	ES	PS	
			Stadial	PFS	PFS	PS	
			Kishlyanski interstadial	EFS	EFS	PFS	PF
			Stadial	PFS	PFS	PFS	TFS
			Ketrosy interstadial	EFS	EFS	PF	PFS
			Stadial	PF	POW	POW	PF
70.0	Mikulino interglacial				IFS	IF	IF
130.0	Dnieper glasial						
			Interstadial				POW
			Interstadial				POW
170.0			Interstadial				POW
200.0							



Notes. PT, periglacial tundra, PFT, periglacial forest-tundra, TFS, tundra-forest-steppe, PS, periglacial steppe, PFS, periglacial forest-steppe, POW, periglacial open woodland, PF, periglacial forests, ES, extraglacial steppe, EFS, periglacial forest-steppe; IFS, interglacial forest-steppe, IF, interglacial forests *1* – mixed forests; *2* – broad-leaved forests

hornbeam, and elm; *Mk2* – pine-birch forests with spruce and undergrowth of *Betula fruticosa* (first endothermal); *Mk3* – birch forests with *Carpinus betulus*, *Quercus robur*, *Q. petraea*, *Tilia cordata*, *T. tomentosa*, *Corylus colurna*, *Ulmus laevis*, etc ; *Mk4* – pine-spruce forests with oak, hornbeam, elm, etc.; *Mk5* – hornbeam-oak forests (thermo-xerotic maximum); *Mk6* – birch-cedar-spruce and hornbeam-oak forests; *Mk7* – pine forests with birch and yernik tier (second endothermal); *Mk8* – birch-spruce-cedar and hornbeam-oak forests with beech, linden, elms, hazel tree, etc.; *Mk9* – oak-hornbeam forests (thermo-hygrotic maximum); *Mk10* – birch-pine forests with oak, hornbeam, linden, and elm; *Mk11* – cedar-spruce and birch forests. As we see, even endothermal coolings were characterized by a rather moist climate. The first Early Valdai cooling resulted in the expansion of open pine-birch forests with *Betula nana*, *B. fruticosa*, and *Alnaster fruticosus* in the undergrowth into this territory. However, during the subsequent Ketrosy interstadial pine-birch forests with oak, linden and hornbeam, similar to interglacial forests of the same territory, were predominant. Only from the second Early Valdai cooling and almost up to the early Holocene (with the possible exclusion of 16.5 – 15.0 ka interstadial) was the Desna Valley occupied by periglacial forest-steppes, steppes, and tundra that developed under low temperatures and precipitation below 350 – 450 mm a year, i.e., under conditions corresponding to a low level of northern seas characteristic of the Valdai period.

Findings from the entire East European loess province suggest that forest formations typical of optimal phases and represented by broad-leaved and coniferous-broad-leaved associations of European and Panholarctic elements of dendroflora, predominated during the Mikulino interglacial in the Volyn-Podol, in the northern part of the Central Russian Upland and in the Dnieper Lowland, as well as in the Eastern Caucasian piedmonts. At that time, the Dniester and the Oka-Don loess regions were occupied by forest-steppe landscapes with a lesser supply of moisture. The reconstruction points towards the necessity of taking into account regional peculiarities of paleoclimatic changes on various territories when any correlations are being attempted.

Thus, our results, as a whole, support the hypothesis that implies longer (up to 70 ka) duration of the first Late Pleistocene marine transgression and, in all probability, of the last interglacial. Notably, judging from the ESR-dates obtained close to 145 ka and numerous indications of a drastic warming of the climate in the end of OIS 6, the sea level rise and the global warming may have started much earlier than suggested by the oxygen isotope chronology (ca 128 ka) (Martinson et al., 1987).

Conclusion

Thanks to the comprehensive approach to the construction of chronostratigraphic framework, reconstruction and global correlation of environmental changes based on two independent sources of climato-chronostratigraphic information, a record of paleoenvironmental changes in the Mid-Late Pleistocene was constructed and supported by the data of absolute geochronology for the last 600 ka. The findings suggest that during that period, the climate in North Eurasia was characterized by periodic changes and was directly related to sea-level fluctuations and the global ice volume changes. The comparison of ESR chronostratigraphic levels and climate-related features of pollen spectra in the LPF sections with oxygen-isotope curves of deep-sea sediments reveal a good agreement between them for the 11 upper stages.

The comparison of nine successive interglacial palynofloras in the most complete, nearly uninterrupted Pleistocene suites of loess regions of the East European Plain and phytocoenotic successions of nine interglacial climatic rhythms has made it possible to establish that among the interglacial stages in vegetation evolution over the past 600 ka, the most humid thermochron was the Muchkap interglacial, the warmest one was the Likhvin interglacial, and the most continental climate (apart from the Holocene) existed during the Mikulino interglacial.

The comparison of ESR-dated warm-climate-related deposits with phytocoenotic and climatic successions of the interglacial climatic rhythms in LPF sections demonstrates the absence of considerable stratigraphic breaks in the latter, at least during the Brunhes chron.

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S-S TECHNIQUE OF TL DATING: TESTING ON THE DEAD SEA SHORE, PRACTICE IN GORNY ALTAI, AND PALEOGEOGRAPHIC IMPLICATIONS

Introduction

Timing Pleistocene events is an important problem in geology and archeology. Many discussions arise because of "mute" sedimentary sections, especially in mountain regions, or scarcity and ambiguity of data Quaternary deposits in mountain valleys are often unsuitable for traditional radiometric dating as they occur within complexes that lack ^{14}C and U-bearing components. Dosimetric dating by TL, OSL, ESR, and other techniques are applicable to loess sequences in plains, but in mountains their use has been experimental and limited so far.

Besides the limitations of dating techniques, ambiguity is associated with the lack of concert between specialists in dating and geologists who interpret the results. Dating of rocks is, as a rule, based on analysis of a detectable time-dependent component in some physical process in the rock history. Specialists in chronology are not always aware of geological effects on the selected component, while geologists cannot master dating techniques when applying necessary corrections.

Special experiments through the past decade (Sheinkman, 1990a, 1995a; Shlukov et al., 1990; Sheinkman, Shlukov, 2001) meant to (1) show that these contradictions are solvable, to (2) time Quaternary deposits in mountains in cases when traditional techniques are inapplicable, and to (3) reduce randomness in dating by proceeding to dense measurements instead of scarce single determinations. The experiments were aimed at testing and further implementation of new dating techniques suitable for deposits in mountain valleys. To avoid errors, the gained experience and geological interpretation of data was combined with a special insight into the dating procedure.

Initial publications (Sheinkman, 1988, 1990a; Shlukov et al., 1990) showed the necessity of providing more details of the experiment, of better justifying the choice of techniques, and of deciding whether Quaternary deposits in mountain valleys are datable in principle. The main results of the required research and testing of the new technique are the subject of this paper.

The authorization for using the new TL dating technique was granted to us by A.I. Shlukov's research group only after careful testing. The S-S method was first tested on representative sections in the Russian Plain (Shlukov et al., 1990) and applied to deposits in the Siberian mountains only after a large amount of good-quality data had been obtained (Sheinkman, 1990a, b, 1993a, b; Sheinkman, Barashkova, 1991) and after acceptable results had been received from another method (the so-called "nanocyclite analysis" or "NC" (Afanasiev, Arkhipov, 1990)) developed in search for reliable dating in mountain valleys and for a correlation basis. Later testing of the S-S technique on Dead Sea sections against radiometric data (Sheinkman, Shlukov, 2001; Sheinkman, Plakht, Mazor, 2001) proved its validity for different regions.

The studies were conducted in many sites in order to select the environments most suitable for TL dating. The dating technique was designed to meet the following requirements:

– its results should agree with those of other reliable methods;

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– information should be gained on the spot in an amount sufficient for at least preliminary statistical processing and accounting of possible age errors;

– the technique should be well-grounded in terms of its physics, and easy for users to master and test

Methods

The S-S technique of TL dating applied to sample collections of Quaternary deposits is based on detailed analysis of thermoluminescence of minerals. The method was developed in the 1980s by Shlukov's group on the basis of experiments carried out within the Russian Plain (Shlukov et al., 2001), and by Shlukov and Sheinkman in the mountain valleys of the Altai and Israel (Shlukov et al., 1990; Sheinkman, 1990a, 1995a; Sheinkman, Shlukov, 2001) and many years of studies by our colleagues at the Tomsk University (Matrosov, Pogorelov, 1978; Matrosov, Chistiakov, Pogorelov, 1979).

Recording TL energy signals was first applied to age determination of rocks in the 1960s in the USSR (Morosov, 1968), and then spread widely all over the world (Aitken, 1985, 1998; Berger, 1988; Wintle, 1997; Stokes, 1999). TL dating is based on the property of crystal-phosphorus minerals to accumulate the background radiation energy of radioactive elements that almost always occur in sediments. TL energy in minerals accumulates exponentially depending on their properties, which also control the time of saturation. Release of TL energy can be induced by heating and measured as radiation at light frequencies. The recorded light sum in a series of snapshots at certain temperatures (180, 300 °C, etc.) is the criterion of the time function of the TL signal.

The release of TL energy in a mineral triggered by ultraviolet radiation or heating solves the problem of datum. The pre-genetic memory of the mineral is erased by the forced release of TL energy prior to burial (zeroing, or bringing to the least possible TL level by light exposition for fine-grained sediments or by burning for artifacts) and is regained later on after the burial. Thus the age of rocks is estimated by comparison of samples that have gained new age information after zeroing with zeroed and saturated samples and by calculation of the exponential growth of TL energy.

The main problem is in obtaining saturated samples. Normally they are prepared by laboratory radiation in a field much stronger than the *in situ* field, which is not always acceptable (Matrosov, Pogorelov, 1978; Matrosov, Chistiakov, Pogorelov, 1979; Shlukov et al., 1990; Shlukov et al., 1993). Fast laboratory saturation of minerals for hours or days (or even minutes as in earlier experiments on TL dating of samples from the Altai (Il'ichev et al., 1973)) is by no means equivalent to natural saturation that takes thousands of years. Fast saturation produces an additional induced signal which biases the light sum vs. radiation dose curve Extrapolation of this biased TL signal causes significant overestimation of ages (the older the samples the greater the error) (Shlukov et al., 1990; Shlukov et al., 1993), which causes most debates. Some published >300 ka TL ages not checked by correlation are apparently overestimated. For instance, the deposits of the famous Diring Yuriakh site in Yakutia first dated by O.A. Kulikov from five samples in a range of 1.1 to 2.9 Ma turned out to be as young as 0.25 Ma (Waters et al., 1999).

Generally, the TL age method is a good dating tool but the results of techniques associated with induced TL signals should be considered with caution. There were some attempts to apply various corrections which often yielded times at lower ages (Hiutt, 1990; Aitken, 1985, 1998; Wintle, 1997) but the problem remains difficult and not completely resolved.

In the S-S technique ages are calculated in the sand fraction of quartz from peak energy release at a temperature of about 300 °C, which is the most reliable age criterion for quartz (Shlukov et al., 2001). In this case the natural standards (the deposits that have accumulated TL energy for a long time) can serve as saturated samples. The average accumulation time for quartz is 200 – 300 ka years but may be half that in a high natural gamma field or, sometimes, longer in low background fields.

The measurement procedure is simplified with the S-S technique: a specimen is cleared from impurity, placed on a heater, the heating-induced TL signal is recorded as a glow curve, and the age is calculated from its amplitude. Sampling should be preceded by analysis of deposition to know whether the sediments were exposed to light before burial and whether their pre-genetic memory had been zeroed. Moreover, bias from impurity, which is difficult to remove completely, should also be taken into account. The age of samples with minor impurity can be estimated at least tentatively, in the order of magnitude, but samples with strongly biased TL signals should be rejected. Even with these complications, the S-S technique allows avoiding the expensive and complicated procedure of laboratory saturation, makes processing faster and cheaper, and eliminates errors from the induced TL signal, which is the main drawback of traditional techniques.

The testing of the S-S technique on the well-documented Russian Plain was checked against numerous ^{14}C dates (Shlukov et al., 2001). Quaternary deposits in the mountains of Siberia are much less studied, and organic remains are rare. There the S-S results were correlated to NC (nanocyclite) ages (Afanasiev, Arkhipov, 1990) usually obtained for plains and tried for the first time for mountain regions. The NC method is a modification of varve analysis and implies revealing subtle mechanisms of deposition. In the case of the deposition of silt and finer fraction in water basins which were stable over the studied period of time the deposition process is sensitive to gravity perturbations, and thickness variations of unit sediment layers reflects interaction of planets in the solar system, which is the main forcing mechanism. In terms of physics. deposition of coarser particles in periods of a stronger gravity field makes the unit layer thicker, and vice versa, thinner unit layers of finer particles are deposited in a lower gravity field. The general rhythmic pattern of layers reflects variations of the gravity field, and its chronology can be calculated precisely by astronomic methods. Other explanations appear much less convincing against this obvious correlation of computed gravity perturbation curves and thickness variations of unit layers in natural sedimentary sections.

The main testing of the S-S technique was carried out in sections of the Dead Sea shore (Sheinkman, Shlukov, 2001; Sheinkman, Plakht, Mazor, 2001), reliably dated earlier by ^{14}C and U/Th methods (Stein, 2000). In general, S-S ages there were practically identical to the earlier data despite a scatter of values which is common to any age method (Fig. 1).

Historic background

Sections in the Chagan-Uzun River valley (the main tributary of the Chuya River) were dated in the 1970s using the TL techniques available at that time (Il'ichev, Kulikov, Faustov, 1973; Markov, 1978) and taken for comparison in this study. No direct ages have been obtained for the archaeological sites of the area but the geological implications are applicable to the hosted artifacts as the valley environment clearly displays all the main stages of the Quaternary evolution. The origin and evolution of the Quaternary complexes of the valley have been a subject of discussions since the 1960s (Devyatkin, 1965; Popov, 1972; Markov, 1978; Sheinkman, 1993a, b, 1995b), and more clarification of this point would allow an approach to a number of key issues of the Pleistocene paleography of Siberian mountain regions.

In the Pleistocene the upper reaches of the Chuya River experienced the effects of ice streams that originated high in the mountains and stopped in the Chuya and Kurai intermontane depressions. Paleoglaciology and geocryology of the basin fill (Sheinkman, 1990b, 1993b, 1995b) shows active periglacial processes during the Pleistocene in which, however, ice streams made foot glaciers around basins rather than fill them. The contours of these glaciers are marked now by terminal moraines that block troughs starting high in the surrounding mountains (Fig. 2).

The Chagan-Uzun valley is dammed in the lower course by perfectly expressed terminal moraines left by the maximum glacier advance (see Fig. 2); in its middle course a 150 m sandwich-type section of gray glacial facies overlying red-colored preglacial deposits is exposed on the steep sides of the Chagan and Taldura river valleys.

The previous TL dating in the Chagan-Uzun valley (Il'ichev, Kulikov, Faustov, 1973; Svitoch, Il'ichev, Faustov, 1973; Markov, 1978) was direct and applied mostly to glacial deposits. In addition to laboratory saturation of samples, the pre-genetic memory of minerals was inferred from measured residual TL signals in the moraines of present-day glaciers (Vlasov, Kulikov, 1987). This approach, however, is wrong in terms of glacial geology. Old and modern moraines are buried in quite different conditions and by different mechanisms. It is virtually impossible to separate the pre-genetic memory of buried minerals, which are not exposed to the sunlight in most moraines, whereas the contents of radiogenic elements responsible for the background radiation and its effect on the TL signal are distributed unevenly over the valley (Sheinkman, 1995a). Glacial and glaciofluvial deposits suitable for TL analysis are thus extremely rare, being restricted to fine-grained ablation sand reburied upon glacier surfaces, especially sand near large boulders washed by meltwater, or sediments on the bottom of small lakes inside the glaciers.

In this study most ages of moraines were determined from the correlated deposits rather than by direct dating. The samples used in (Il'ichev, Kulikov, Faustov, 1973; Svitoch, Il'ichev, Faustov, 1973) are from basal moraines in which the pre-genetic signal is impossible to estimate, and the dating results are inevitably biased and incorrectable.

Over fifty S-S ages obtained in the Chagan-Uzun catchment during our research are checked against NC or ^{14}C data, if suitable material was available. The NC measurements were carried out in lacustrine-glacial pelitic silt for the lack of other layered textures. Sampling included all paleo-indicators but not all data could be processed because of technical limitations that showed up later.

After the dating results had been published (Sheinkman, 1988, 1990a, b), Svitoch (1991) argued that the data from the lower reaches of the Chagan-

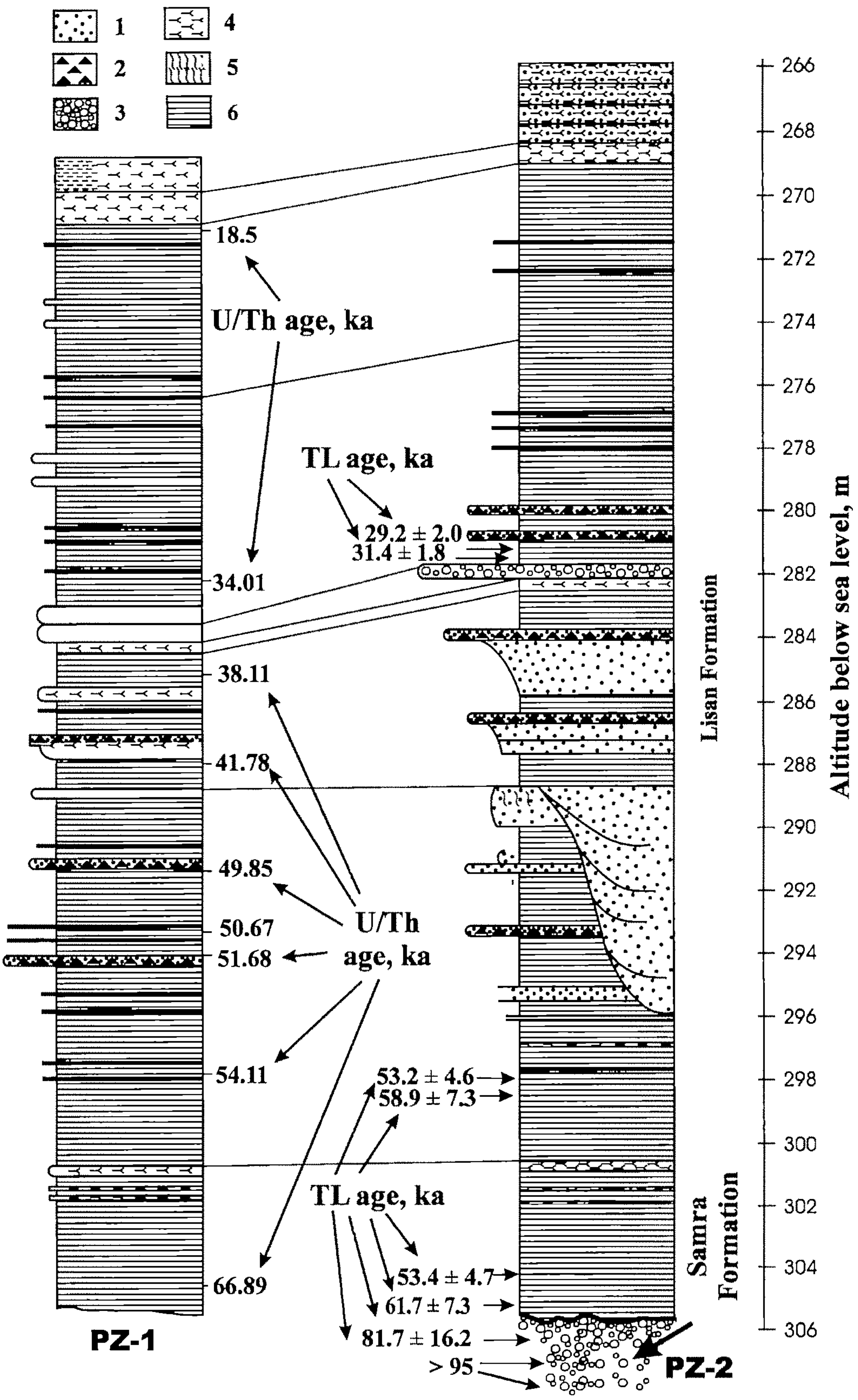

Fig. 1 Testing of S-S technique of TL dating on correlated sections PZ-1 and PZ-2 on the Dead Sea shore. Ages on the left are U/Th results after (Machlus et al., 2000) and those on the right are TL S-S results after (Sheinkman, Shlukov, 2001).
1 – sand, *2* – ripples, *3* – gravel, *4* – gypsum, *5* – soil, *6* – aragonite, clay, and silt.

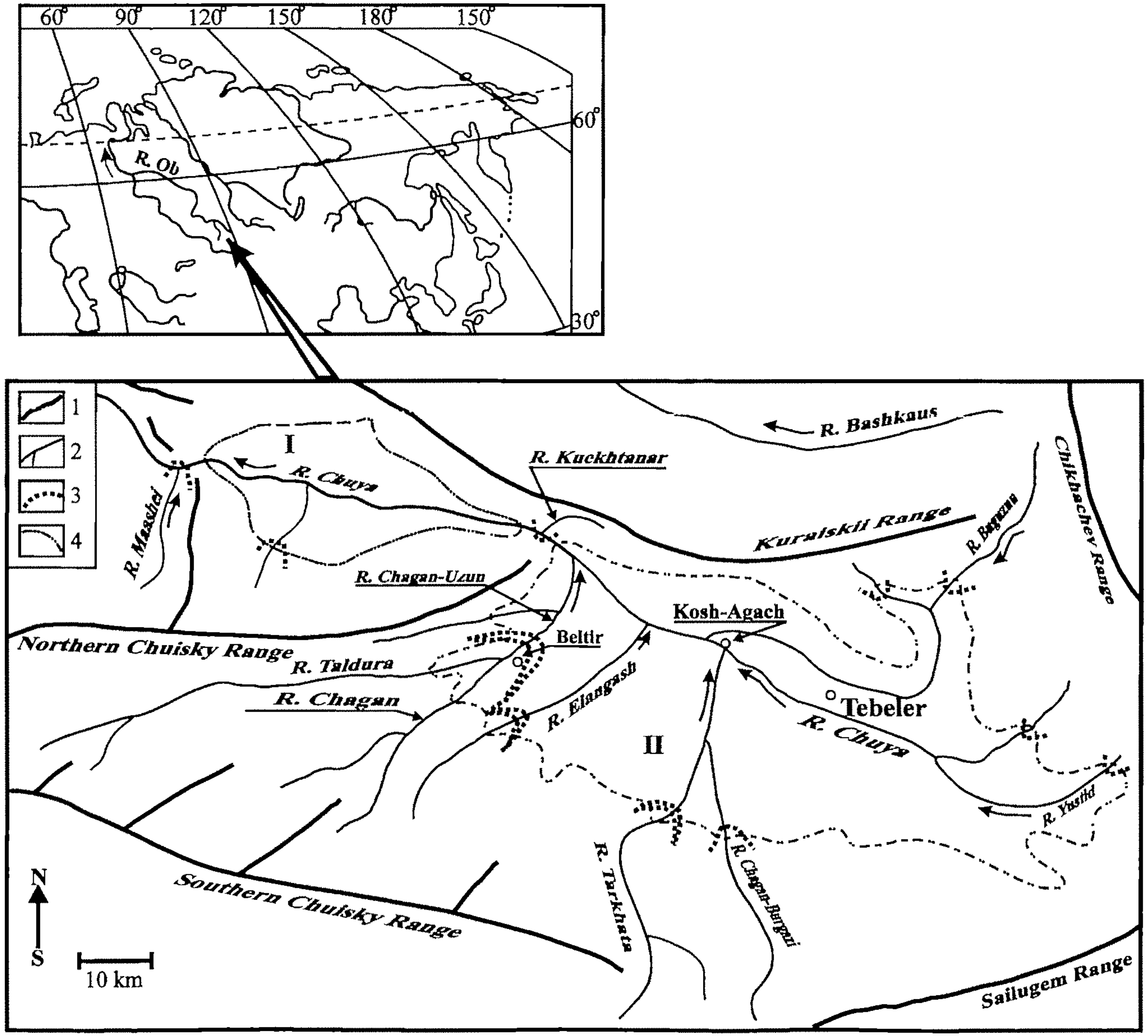

Fig 2. Map of the study region.

1 – mountain ranges, *2* – rivers, *3* – terminal moraines, *4* – limits of Kurai (I) and Chuya (II) intermontane basins.

Uzun valley were poorly correlated, believing them to be from moraines of a glacier tongue basin. However, they were from moraine-related damlakes of various ages and showed good agreement with data obtained by other methods. Moreover, NC measurements occasionally revealed seasonal and annual rhythms in lacustrine-glacial deposits which bear evidence of the duration of seasonal ice and sedimentation rate in old lakes, and this shed light on some related problems of paleogeography.

NC analysis requires continuous sections: the greater number of continuous layers analyzed the greater the accuracy of age estimates, while breaks of a few hundred years' layers may cause considerable uncertainty. The NC age of the deposits was determined either to thousands or to hundreds of years, or even to years and seasons. NC measurements revealed a particular deposition mechanism in representative lacustrine sections in the Chagan-Uzun valley for which earlier estimated sedimentation rates (Markov, 1978; Rudoi, 1981; Butvilovsky, 1993) varied from a few millimeters to tens of centimeters per year. This mechanism provides deposition of pelitic silt alternated with fine sand interbeds at a rate of 1 – 1.5 cm per year, as is typical of many overflowing mountain lakes (Sevastiyanov, 1982). A number of estimates of ice season duration gave an idea of the lakes that left these deposits (Sheinkman, 1997).

The terminal moraines in the lower reaches of the Chagan-Uzun were often assigned a Late Pleistocene age based on geological data, while the gray section exposed in bluffs in the middle course was either attributed to the Late Pleistocene (Popov, 1962, 1972) or divided into a Late Pleistocene unit and older moraines (Devyatkin, 1965; Markov, 1978). At the same time, Il'ichev, Kulikov, and Faustov (1973: 252) who were the first to undertake TL dating of this moraine complex, mentioned a Middle Pleistocene age of the Chagan glacial deposits as universally accepted but they did not comment about the inference of a Late Pleistocene age of the gray section known, for example, from (Popov, 1962, 1972).

Results

The gray-color deposits in the Chagan-Uzun valley originated in different ways and clearly depict advance and retreat cycles of Pleistocene glaciers. Especially spectacular is an over 10 km exposure of Quaternary deposits along the left side of the Chagan valley (right Chagan-Uzun branch). There we dated several blocks in the longest Kyzyl-Yar section and in the Tedash section upstream (section names were given by Sheinkman following the local names of the valley segments) (Fig. 3).

The ages in (Il'ichev, Kulikov, Faustov, 1973; Svitoch, Il'ichev, Faustov, 1973) are much older than ours, most likely as a result of overestimation by the dating techniques they used. This does not mean, however, that all previous TL estimates are wrong. NC dating (Afanasiev, Arkhipov, 1990) confirms some quite old TL ages. Anyway, one should be cautious about these data as it is difficult to account for errors inherent in the former TL techniques.

The upper section in the Chagan exposure involves alternation of the basal moraine and glaciofluvial pebbles (most often 8 to 12 m thick, occasionally up to 20 m) that periodically grade into syngenetic lacustrine-glacial and lacustrine-fluvial deposits. These transitions veil the glacier cycles, especially because of glacial erosion and the deposition of different generations and magnitudes. Massive blocks of overlapping basal moraines and interglacial deposits may contain interbedded boulders, pebbles, sand, and silt. Sandwich-type sections that are locally exposed reflect glacial/interglacial cycles: from three to six units in different parts of the Chagan exposure.

The uppermost moraine rests as a 5 – 8 to 10 – 12 m thick continuous uniform mantle upon a watershed peneplain surface accreted to the mountains. Syngenetic deposits are periodically projected on or included into this basal moraine. These samples deposited in water or limnic-glacial environments received a number of age determinations. The first NC date of <140 ka years (more precise estimates were impossible because of discontinuous bedding) was obtained for a small lens of lacustrine-glacial silt in the section nearest to the river mouth (Kyzyl-Yar-1 block, point 1 in Fig. 3); then an NC age of 59.4 ± 9.8 ka was obtained for equivalent sediments in the Kyzyl-Yar-2 block and two TL ages (58 ± 7 and 61 ± 7 ka) for syngenetic sands (points 2 – 4 in Fig. 3).

The following cycle in the Chagan exposure is difficult to distinguish. Often massive blocks of similar overlapping basal moraines cut by glaciofluvial pebble lenses occur to depths 70 – 80 m below the surface, as in the Tedash section, or pebbles themselves make up massive blocks cut with moraine lenses, as it often occurs in the Kyzyl-Yar section. A TL age of 145 ± 13 ka has been established from one moraine in the center of this section (Il'ichev, Kulikov, Faustov, 1973), though dating of such deposits is in principle incorrect. In this study TL ages of 79 ± 8 and 85 ± 11 ka were obtained for glaciofluvial pebbles in the Kyzyl-Yar-3 block (points 5, 6 in Fig. 3), and similar pebbles in the Tedash section (points 13 in Fig. 3) showed about the same age (81 ± 10 ka). Values of the same order of

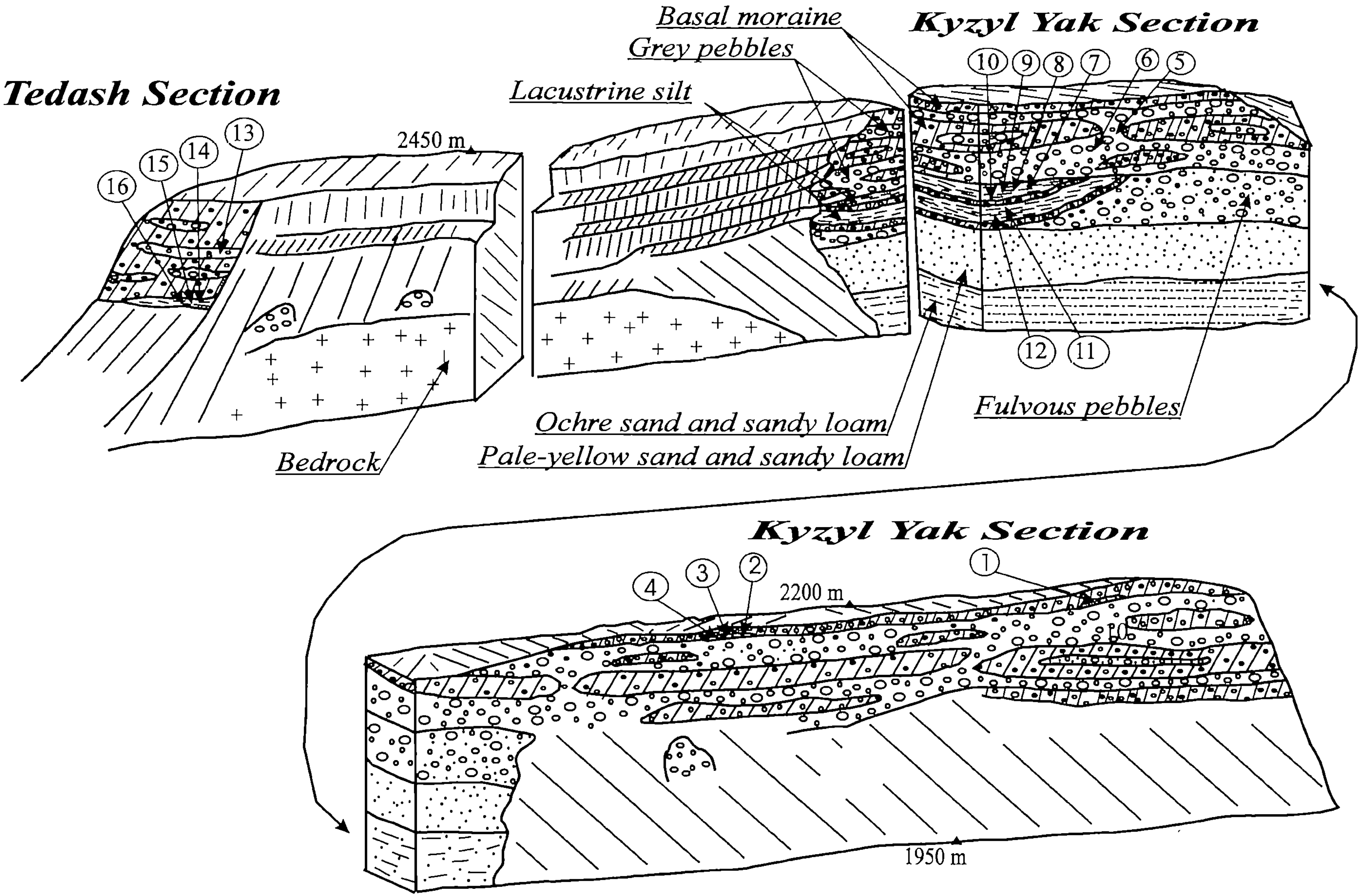

Fig. 3 3D sketch of Chagan exposure and sampling sites. See the text for explanation.

magnitude were obtained for equivalent sequences in the Taldury catchment in a valley incised into the same peneplain.

Two lenses of lacustrine-glacial pelitic silts (10 – 12 and ~ 20 m thick), enfolded into each other and separated by 10 – 12 m basal moraine, occur beneath an 80 m thick sequence of alternating moraines and pebbles roughly in the middle of the Chagan exposure. The lower lens is underlain by another moraine of nearly the same thickness and is enclosed together with the latter into a section of brown preglacial alluvium (Fig. 3). The moraine that cuts the lacustrine deposits was not mentioned in (Il'ichev, Kulikov, Faustov, 1973; Markov, 1978), and their TL age was determined from the underlying moraine dated at 266 ± 30 and 476 ± 51 ka. Our ages again turned to be much younger.

Three NC dates, 105.8 ± 7, 108.7 ± 10.6, and 111 ± 75 ka (the low accuracy of the latter is caused by discontinuous bedding) and a TL age of ≥ 100 ka were obtained for the upper lens of lacustrine silts (Kyzyl-Yar-4 block, points 7 – 10 in Fig. 3), and NC ages of 131.7 ± 12 and 133 ± 10 ka for the lower lens (Kyzyl-Yar-5 block, points 11, 12 in Fig. 3). The details of the transition from this section to the Tedash, further up the valley, are hidden under debris flows. Yet, equivalent lacustrine-glacial silts cleared out beneath a well-pronounced moraine block showed an NC age of 121.7 ± 9.1 ka and TL ages of 121 ± 14 and 135 ± 15 ka (cited downsection, points 14 – 16 in Fig. 3). A TL age of 81 ± 10 ka was obtained for the pebbles that cut the overlying moraine (point 13 in Fig. 3).

Samples from the red-colored section at the base of the Chagan-Uzun exposure showed TL saturation. Earlier TL ages, in a range of 560 to 1500 ka for these sediments (Svitoch, Il'ichev, Faustov, 1973; Markov, 1978), in our opinion reflect an induced rather than a natural TL signal. Unfortunately, there were no sediments suitable for NC dating, and the exact age of the red-color formation could not be estimated.

The section in the lower reaches of the Chagan-Uzun is exposed in a deep canyon (Fig. 4). The age of the distal moraine that marks the maximum glacier advance could not be determined more accurately than just Early Zyryanian (Early Weichselian) (Sheinkman, 1997) because it was impossible to free the chronometer minerals from impurity. An NC age of 85 ± 10.6 ka was, however, obtained for the bottom sediments of a lake that emerged before the proximal terminal moraine (point 3 in Fig. 4). These sediments are preserved upstream, either buried or within isolated fragments of high terraces along the valley sides (up to 60 m and higher above the present river surface). Two more NC ages (both 80 ± 12 ka, points 15 and 16 in Fig. 4) were determined for the upper layers of these terraces, and a TL age of 74 ± 9 ka (point 13 in Fig. 4) shows the presence of buried deposits of the same generation.

Another riegel moraine complex occurs not far from the cirque of the terminal moraine about one kilometer up-valley, and is associated with another larger and a more intricately structured glacier tongue basin. The riegel is overlain by a sandwich-type section of the basal moraine deposits alternating with pebble beds that resemble the equivalent layers of the Chagan exposure but are darker and better washed. Upstream the moraine complex is buried beneath lacustrine sands and pelitic silts, often cut with pebble beds, which belong (outside the watergap) to a terrace a few dozens of meters above the present river surface, i.e., lower than the mentioned high terrace.

A TL date of 90 ± 12 ka was obtained for a sand lens shaded by a large boulder at base of the basal moraine (point 4 in Fig. 4). Rocks within the glacier tongue basin turned to be much younger, with TL ages of 63 ± 7 and 61 ± 7 ka for the lower, 53 ± 6 ka for the central, and 40 ± 5 ka for the upper parts of the limnic section (points 5 to 8, respectively, in Fig. 4); an excursion of 100 ka was measured in point 9 near point 8, possibly because the pre-genetic signal was not destroyed completely for some reason.

A TL age of 83 ± 9 ka was obtained for a sand lens in a fragment of a moraine stripped by the river in the center of the glacier tongue basin beneath lacustrine-glacial and glaciofluvial deposits, while a pebble bed overlying the moraine gave an age of 72 ± 8 ka (points 10 and 11 in Fig. 4). Samples from the middle of a 20 m thick section of a lake terrace upstream, above the pebble bed, showed a TL age of 62 ± 7 ka and an NC age of 51.4 ± 7.1, and a sample from below the pebbles gave a TL age of 74 ± 9 ka (points 12 – 14 in Fig. 4).

The upstream part of the Chagan-Uzun glacier tongue basin is barred by a moraine overlying lacustrine deposits ploughed by a glacier up the valley in the trough floor. Il'ichev obtained a TL age of 58 ± 7 ka for a sample from this moraine and 32 ± 4 ka for the underlying lacustrine facies (Il'ichev, Kulikov, Faustov, 1973; Markov, 1978); the latter date correlates with the ^{14}C age of 25.3 ± 0.6 ka. Unfortunately it is impossible to judge the state of the samples and their suitability for dating, as Il'ichev himself died soon after that field trip and his field notes lack description of the samples. According to his colleagues, the samples were most likely from younger superposed deposits often encountered in glacier tongue basins. Therefore, the ^{14}C age only indicates that the lake deposits are older, which agrees with our data.

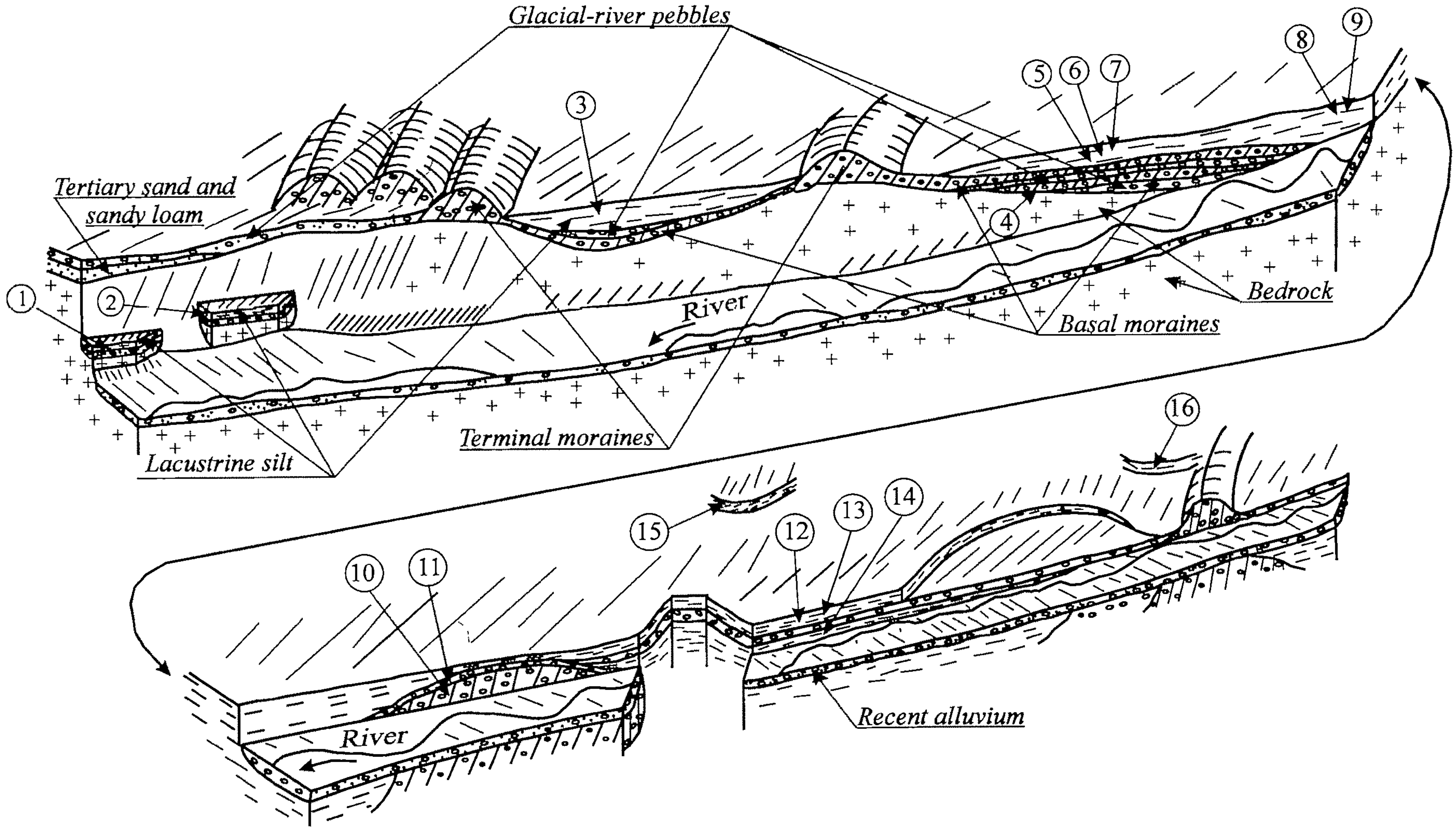

Fig 4 3D sketch of the lower Chagan-Uzun River valley and sampling sites See the text for explanation

A number of TL, ^{14}C, and NC age determinations in the Chagan valley outside the glacier tongue basin (Sheinkman, 1992, 1993b, 1995b) revealed a Sartan (Late Weichselian) section produced by glaciers that never reached the peneplain. Note that a comprehensive study of the glacial setting (Sheinkman, 1993a) showed nonglacial origin of the samples from the Chagan-Uzun valley below the terminal moraine, where some authors expected to find traces of older and stronger glacials (Devyatkin, 1965; Okishev, 1982).

Glacial deposits occasionally encountered in the Chuya valley are related to Chagan-Uzun syngenetic glaciers descending along other tributaries of the river. These deposits are found, for instance, 6 km downstream of the Chagan-Uzun mouth at the end of the Kuekhtanar River valley. This valley is occupied by a short but voluminous glacier that, unlike the Chagan-Uzun glacier, reached and barred the Chuya valley, which was free from glaciers (see Fig. 2).

The motion of glaciers (the Kuekhtanar glacier, together with a small glacier that moved in the opposite direction from the Northern Chuya Range) that barred the Chuya valley gave rise to a number of ephemeral pond lakes (Sheinkman, 1997). They produced wavecut cavities in the outer cirque slope of the terminal moraine that barred the Chagan-Uzun valley and left low limnic terraces preserved in fragments in the watergap. NC age determinations of silt from these terraces (points 1 and 2 in Fig. 4) yielded 62.2 ± 5.6 ka (from a higher terrace) and 45 ± 11 ka (from a lower terrace).

TL ages of a Sartan (Late Weichselian) range, 14.5 ± 1.5 and 13 ± 1.5 ka, were obtained from the uppermost sandwich-type section of glacial/glaciofluvial/glacial-lacustrine deposits exposed in the Kuekhtanar mouth along the Chuya riverbed, specifically from the bottom sands of a damlake formed before the youngest moraine. The average TL signal in samples from the underlying section indicates a Zyryanian (Early and Middle Weichselian) age of the older moraines. More exact age determination was inhibited by impurities.

According to V.V. Butvilovsky (1993) who has done a lot of ^{14}C dating in the Altai including deposits in the Kuekhtanar mouth (his ^{14}C ages of preglacial deposits approach the instrumental limit of the method), the entire glacial complex fits the Sartan time scope. However, this timing may be biased by an underestimation of near-limit ^{14}C ages (Arslanov, 1987; Wagner, 1998): more advanced techniques broaden the age limits to Lower Weichselian time

Dating of periglacial subaerial deposits ubiquitous in the Chuya basin (Sheinkman, 1993a), namely of cryogenic-aeolian mantle loam and fan deposits, places them within the Sartan Glacial, the coldest time in the Pleistocene (e.g., a TL age of 12 5 ± 1 ka for the upper part of the alluvial fan of the Chagan-Burgazy river).

Paleogeographic implications

The paleogeographic interpretation of Quaternary events in Siberia has long been viewed in terms of the Arctic West Siberian model of climate change and related glaciations that stems from V N. Saks's reconstructions (1953), leaning towards a European background. Later on this model has been repeatedly revised and updated (Arkhipov, 1989; Arkhipov et al., 1997; Zykin et al., 2000) but it has been generally confirmed by data from northern West Siberia, and its concepts have been actively used elsewhere in Siberia Preliminary TL results in the Altai (Markov, 1978) also agreed with that model, but studies of glacial environments along the northern and eastern mountain surroundings Siberia show that the model needs special corrections when applied to inner Siberia, with its continental conditions quite different from those in West Siberia As a result, later test-dating of the Altai sections showed much younger ages (Sheinkman, 1988, 1990b, 1992, 1993b, 1995a).

The progressive climate cooling did lead to glaciation with a maximum in the first quarter and a minimum in the end of the Quaternary in northern West Siberia and in Europe, subject to the Atlantic influence. In inner Asia, however, where continental climate conditions were stable throughout the Pleistocene, the cooling was associated with an arid and cold climate, and the glaciation accompanied by deep freezing of the periglacial zone culminated in the earliest Late Pleistocene. Moreover, the continental climate in the specific conditions of Siberia provided an extreme sensitivity of the entire ecosystem to environmental changes. Milankovich cycles (1939) must have been well pronounced there. Milankovich rhythms account for the specific features of glaciation in the mountains of Siberia as a result of superposition of autochthonous and allochthonous evolution mechanisms of glaciers, which reached their maximum advance by the earliest Late Pleistocene (Sheinkman, 1988, 1990b, 1992, 1995b).

The conclusion of glacier advance in the mountains of Siberia in the beginning of the Late Pleistocene has been now proved valid by independent evidence from the Baikal Drilling Project (BDP) (Karabanov et al., 1998; Prokopenko et al., 2001a, b).

The SPECMAP global change scale (Imbrie et al., 1984) became a reference for the later results. In Siberia these correlations were first undertaken on the basis of the West Siberian scale (Arkhipov et al., 1997; Zykin et al., 2000) and a more complete correlation, including the scale for northern West Siberia, was based on the Baikal record (Karabanov et al., 2001). The southeastern Altai, where the Chuya catchment basin is located, is a typical continental mountain province of Siberia, and the Altai data collections, with numerous recently obtained dates, may also provide a good background for correlations.

Note only that unlike the continuous records of ice cores, bottom sediments, loess sequences, etc. (Imbrie, 1984; Petit et al., 1999; Prokopenko et al., 2001b; Junfeng, Balsam, Chen, 2001; Servant, 2001), the record of the glacial deposits of the Altai is incomplete because of repeated deposition breaks. As a rule, these deposits can be only correlated with nearby continuous sequences (e.g., (Karabanov et al., 1998; Baumann et al., 1995)).

Moreover, the TL age method, which has no alternative in mountain valley environments, can provide no better than ±10% accuracy, which gives an uncertainty of ±10 – 12 ka already for Early Weichselian time. Therefore, even numerous age determinations available may be insufficient for detailed correlations.

Nevertheless, even with the inevitable scatter of data, a quite well-pronounced regularity is observed in the Chagan-Uzun valley. The ages of the distal (Early Zyryanian or Early Weichselian) and proximal moraines in the lower reaches of the river, where the maximum advance of the 70 km long glacier is marked by a succession of moraine ridges, were inferred from a correlation with 80 ± 12 to 85 ± 11 ka ages of bottom sediments in the related damlake. The same buried sediments are represented by an age of 74 ± 9 ka. The river in the valley floor locally strips moraine deposits correlated with 83 ± 9 to 90 ± 12 ka sediments overlain by pebble beds dated to 72 ± 8 ka.

A number of dates from 40 ± 5 to 62 ± 7 ka were obtained for lacustrine deposits of the second glacier tongue basin located upstream, which owes its existence to another riegel moraine complex. (Note that NC analysis of both dated lake sequences shows freezing seasons typical of interglacial time.) Thus, the proximal moraine of the first complex must be about 85 – 90 ka and the other one about 60 – 65 ka old, which agrees with cold substage 5b (85 – 95 ka) and stage 4 (60 – 70 ka) of the $\delta^{18}O$ stratigraphy, whereas the damlakes before these moraines formed in the time corresponding to warm stages 5a (70 – 85 ka) and 3 (25 – 60 ka).

Correlated with the SPECMAP scale of global ice volume, the Altai results reflect the main climate cycles especially because continental regions were more sensitive to global change, though the ice volume changes in central Siberia had different proportions. Therefore, the coincidence is not fortuitous.

More agreement is observed in dating the Chagan exposure. The oldest moraine underlies 135 ± 15 ka lacustrine deposits and is thus older than that. Hence, the lacustrine deposits above the moraine can be correlated to the warm substage 5e and the moraine itself with the cold stage 6 of the $\delta^{18}O$ scale. The age of the younger moraine sandwiched between two limnic lenses of 100 – 110 ±10 ka and 130 – 135 ±15 ka must be within 110 – 120 ka in the Kyzl-Yar section and <120 ka in the Tedash section where the underlying sediments were dated to 121 – 135 ±15 ka. Thus the moraine can be correlated with the cold oxygen isotope substage 5d and the overlying deposits with the warm substage 5c.

These lenses result from deposition in lakes between moraines, and their structure, according to NC data, reflects the freezing regime similar to that in the existing near-glacier lakes of the region. Reverse magnetization of the lacustrine deposits (Markov, 1978) corresponds to the Blake excursion whose parameters (Harland et al., 1990) agree with at least the ages of the lower limnic section (Sheinkman, 1990b, 1993b).

According to these data, the distal moraine of the terminal moraine complex in the lower Chagan-Uzun valley can also be correlated with the cold $\delta^{18}O$ substage 5d. Short et al. (1991) showed that the amplitudes of the SPECMAP cycles (Imbrie et al., 1984) in central Eurasia do not fit the mean summer air temperatures because of the specific filtering of the Milankovich cycles by local conditions. At the same time, glaciation in continental Siberia directly depends on summer temperatures (Sheinkman, 1987; Koreisha, 1991). Winter temperature variations are less important for the cold glaciers of those regions (the temperatures are very low anyway) but even minor variations in summer temperatures control ablation and ice volume (Sheinkman, 1993a).

In the region about 60°N, 100°E (close to the study area), the strongest earliest Late Pleistocene warming, corresponding to MIS 5e (115 – 130 ka) that marks the Middle/Late Pleistocene boundary, followed a peak of highest summer temperatures (Short et al., 1991). The ensuing first Late Pleistocene cooling of substage 5d (105 – 115 ka) was associated with a relatively small increase in global ice volume. However, in Siberia the cold substage occurred after a strong summer temperature fall which coincided with the transition to cooling from the strongest Eemian (5e) warming (Fig. 5). This led to an unusual climatic combination of relatively high humidity from the eastward propagation of the Gulf Stream, and the

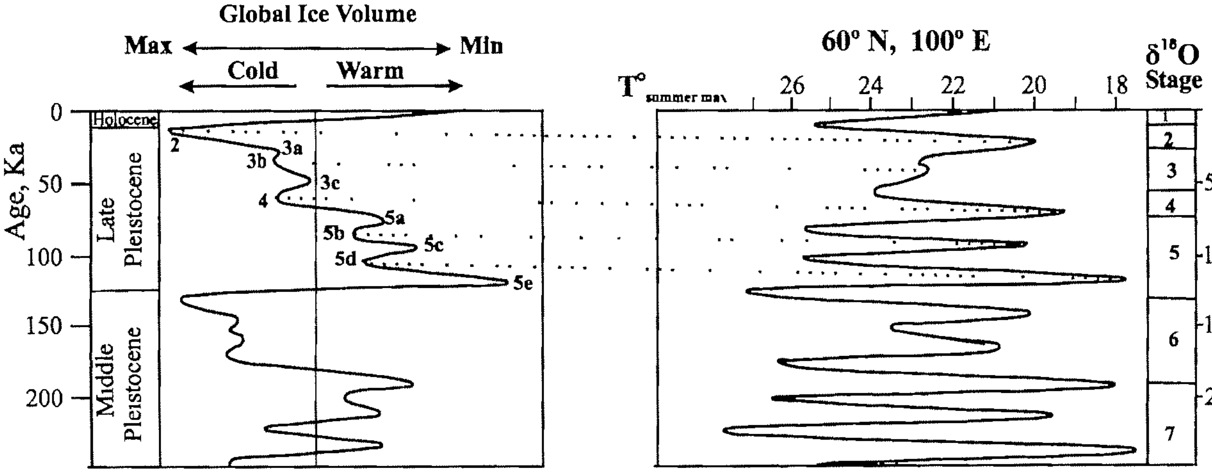

Fig 5. SPECMAP rhythms (left) after (Imbrie et al., 1984) and continental-filtered Milankovitch cycles in Siberia (right) after (Short et al, 1991). See the text for explanation.

onset of cooling with the lowest summer temperatures. This situation triggered the mechanism of glaciation, which culminated in the mountains of South and East Siberia in the earliest Pleistocene and was accompanied by mountain building, progressive cooling and drying of climate, and a specific combination of autochthonous and allochthonous glacial processes (Sheinkman, 1990b, 1992, 1993b, 1995b). The moraine correlated with MIS 6 was deposited at the end of the previous 100-ka cycle, in its driest time, by a glacier that cannot have reached maximum advance and whose traces were buried under the deposits of larger Late Pleistocene glaciers.

Therefore, the distal moraines in the lower Chagan-Uzun valley must record the first stage of the Early Zyryanian (Early Weichselian) Glacial. This inference is supported by biogenic silica variations in the bottom sediments of nearby Lake Baikal in which silty clay units correlate with glaciations (Prokopenko et al., 2001a) and thus confirm the specific character of the earliest Late Pleistocene Glaciation in inland Siberia.

The warming of substage 5c was moderate on the global scale and was apparently damped by the started mechanism of Late Pleistocene glaciation and the following long cold substage 5b (85 – 95 ka). Therefore, although the decreased summer temperature during MIS 5b was much less than during 5d, the moraine deposited at this substage was proximal among several overlapping successive moraines of the terminal complex that barred the lower Chagan-Uzun valley. Nevertheless, the preceding considerable increase in summer temperatures made the glaciers retreat to about one third of their length during 5c, which produced lakes between moraines with 10 – 12 m thick bottom fill (observed in the Chagan exposure).

The glaciers retreated again during a relatively long warm substage 5a (70 – 85 ka) that followed an increase in summer temperatures of about the same magnitude as the previous one (Fig. 5), and left the first glacier tongue basin in the lower Chagan-Uzun. In the middle part of the valley, however, oscillations of glaciers complicated the formation of the basal moraine whose age can be inferred from the cutting pebbles dated from 74 ± 8 to 85 ± 11 ka, i.e., the moraine deposited during substage 5b and the pebbles during substage 5a.

MIS 4 (60 – 70 ka) is marked by the uppermost moraine of the Chagan exposure which is correlated with 60 ± 7 ka sediments. This stage was associated with considerable cooling and followed a fall in summer temperatures almost to the Late Pleistocene minimum. Therefore, the Chagan-Uzun glacier in the middle part of the valley was still able to reach the watershed peneplain and approached the maximum-advance moraines in depressions. The glaciers that barred the Chuya valley were also large enough. The ponded Chuya produced a damlake that abraded the outer slope of the distal moraine in the lower course of the Chagan-Uzun, and provided lacustrine deposition in the watergap dated to 62.2 ± 5.6 ka.

During warm MIS 3 (25 – 60 ka), with the Pleistocene longest summer temperature increase, the Chagan-Uzun glacier retreated to the upper part of the valley leaving a large glacier tongue basin. Lags in this retreat were accompanied by the deposition of glaciofluvial pebbles among lacustrine silt, and the short, cold excursion of substage 3b (40 – 45 ka) may have allowed advance of the glacier. This advance is indicated by 45 ± 11 ka damlake deposits produced by repeated ponding of the lower Chuya valley by glaciers, and by a terminal moraine overlying the tongue basin deposits.

The Sartan (Late Weichselian) complex of deposits corresponds to cold MIS 2 during which the Gulf Stream had already been blocked. Despite extreme cooling, low humidity pushed the glaciers deep into their valleys and permafrost developed on the glaciers' periphery. However, freezing in the Chuya catchment basin was limited. Deposition of subaerial loam and permafrost phenomena occurred in an extremely cold and arid climate, but there are no traces of repeated ice wedges which were found as ice pseudomorphs in Western Tyva east of this region (Sheinkman, 1993a, 1995b).

In general, glaciation in South and East Siberia was highly sensitive to climate change but different regions showed particular responses to specific events recorded in the SPECMAP scale. Nearly all Baikal cores reflect active dynamics of glaciers in the surrounding mountains in the first half of the Late Pleistocene but in the second half of the Quaternary the biogenic silica and silty clay record shows even cooling and, possibly, glacier advance; warm MIS 3 is recorded only in the diatom abundance curve (Prokopenko et al., 2001a). At the same time, stage 3 in the studied Altai valleys was associated with a considerable retreat of glaciers that left large glacier tongue basins with moraine-damlake deposition. The interglacial equated to MIS 3 is, however, distinguished in the correlation of the Baikal sedimentary record with the history of Siberian glacials (Karabanov et al., 2001). Therefore, local responses of glaciation in different regions of Siberia to the events recorded in the SPECMAP scale are still to be investigated.

Conclusion

The large-scale experiment on testing the new S-S technique of the TL age method have shown the real possibility of dating Quaternary deposits in mountain valleys, at least within the range of Late Pleistocene deposition. Despite some discrepancies and uncertainty, the obtained data revealed the main features of the Late Pleistocene paleogeographic history of continental mountainous regions of South Siberia and their response to climate change: glaciation was of a mountain valley type and was associated with the advance and retreat of glaciers corresponding to the main Milankovich cycles.

The conditions for glacier advance in Central Siberia were the most favorable in the earliest Late Pleistocene rather than in the Early or Middle Pleistocene as in northern West Siberia. Later, glaciation there reduced in response to the cooling and drying of the climate (which increased to the end of Late Pleistocene) in accordance with the main events of the marine oxygen isotope record. The existence of mostly mountain glaciers (the conditions for the formation of ice sheets in inland Siberia never arose, even in the highest mountains) in the Late Pleistocene was accompanied by cryogenic processes in the glacier-free zones. As a result, the Early Zyryanian (Early Weichselian) glaciation in the mountains of South Siberia produced twice as much ice volume as the Sartan (Late Weichselian) glacial, which was restricted to the highest mountains.

Of course, timing of rock complexes in mountain valleys only outlines the sequence of past events at this stage of knowledge. The SPECMAP project (Imbrie et al., 1984) revealed an intricate framework of the global dynamics of Quaternary glaciation, complicated by local effects in specific, especially mountainous, regions. This requires large or at least medium-scale collections of dated sediment samples to provide a statistically representative filtered data set.

This requirement can be met only by mastering new approaches and techniques of dating. In this respect, the main conclusion of this study is that the available dating techniques make it possible, in principle, to obtain sufficient data collections and to time Quaternary events from their traces in mountain regions, at least between stages 1 – 6 of the $\delta^{18}O$ scale. This allows an approach to detailed deciphering of even intricate rock complexes of glacial and periglacial origin. High efficiency and accuracy can be achieved only by joint efforts of specialists in geology and geochronology, as TL samples should be selected with regard for the specific features of dating techniques and for the geological effects on the measured time-dependent component.

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EVOLUTION OF PALEOPEDOGENESIS AND THE ENVIROMENT DURING THE LATE PLEISTOCENE IN THE WESTERN TIEN SHAN

Introduction

At the foundation of modern archaeological soil science research is the investigation of specific features of the interaction between mankind and the natural environment, and the dynamics and evolution of human societies (Dergacheva, 1997). Understanding such issues requires a detailed, step by step reconstruction of the paleoecological situation, the modifications of which are associated not only with global changes in climate, but also with regional fluctuations of the natural environment. In connection with this, this work primarily focuses on the analysis of pedogenic features of sediments used for the reconstruction of different components of the natural environment.

The new methodological approach applied in this work does not require the identification of paleosoils as a combination of genetic horizons, but instead uses reconstructions based on the totality of pedogenic features caused by the presence and influence of humus substances in the sediments' mineral section. This is the essence of pedohumus diagnostics of ancient environments, based on the concept that features and components of soil humus correlate with definite combinations of bioclimatic (ecological) conditions (Dergacheva, 1997, 1998a, b). To make the reconstructions, we used a database on the correlation between features of mineral and organic soil components, climate, vegetation, landscape, vertical zonal regularities, and models (patterns) of soil formation.

The mountainous regions of western Central Asia have not been as yet thoroughly studied from the point of view of Late Pleistocene paleogeography, the more so that there exist no detailed reconstructions of paleoecological conditions of habitation of prehistoric humans.

A detailed study of the pedogenic features of sediments of multilayered archaeological sites of various chronological periods in western Central Asia will help researchers formulate a concept of the dynamics of the soil types, as well as the changes in the conditions of soil formation and the climate in each and every specific region on the one hand, while on the other it will be conducive to a reconstruction of the evolution of natural conditions existing in Eurasia during the Pleistocene.

Objects and methods

A study of the most representative multilayered archaeological site of this region, Obi-Rakhmat (Chaktal geomorphologial region, Western Tien Shan), served as the basis for the reconstruction of a detailed picture (with each step representing 250 – 1000 years) of natural conditions in the Late Pleistocene in the Western Tien Shan. The location of the site, a detailed description of the sediments, and their stratigraphy were presented earlier (Derevianko et al., 1998, 1999, 2001).

A number of stratigraphic horizons were formed under the conditions of a changing environment. That is why 24 subdivisions, including the subhorizons, were morphologically singled out. The pedohumic method helped to isolate about 40 subdivisions distinguished by a combination of characteristics of substance composition, and thus revealed the conditions of their formation. A detailed study of 75 samples representing a solid stratigraphic column of sediments helped detect eighteen

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stratigraphic horizons. A series of radiocarbon dates (Ibid.) makes it possible to attribute layers 5 – 14 to the Middle Würm (W_2) and to calculate the approximate speed of sediment accumulation, which averaged between 0.25 and 0.40 mm a year (if the existing breaks are taken into account). Paleopedological research of the grotto sediments was done on the materials of excavations made in 1998 – 2000; it included the study of sediments in layers 2 – 14 (the square Ж-8, column 1) and layers 15 – 17, as well as a part of layer 18 (square И-6, column 2). Selection of samples for the examination of pedogenic features was made at an interval of 5 – 10 cm, which allowed us to make a reconstruction with small steps on the time scale.

The main characteristics of mineral and organic components of paleosoils and sediments (C content, humic acids (HA) – fulvic acids (FA) ratio in humus, $CaCO_3$ content, pH of the water suspension, the ratio of granulometric fractions in fine earth, specific magnetic susceptibility of the sediment, etc.) were determined with the help of traditional methods (Kachinsky, 1958, Arinushkina, 1970; Problemy..., 1984).

Pedogenic features of the sediments in the Obi-Rakhmat Grotto

Generally speaking, the examined sediments are light-colored and contain rock fragments of various sizes. The sediments are distinguished by high density, which makes it difficult to determine their structural condition when describing the morphological characteristics of the materials.

The solid phase of the sediments under study is primarily represented by HCl soluble compounds such as calcium carbonates and hydrocarbonates, as well as well-soluble salts such as sodium, potassium, calcium and magnium sulfates and chlorides. Their quantity averages 77%, reaching 90 – 96% in some of the layers (Fig. 1). Content of melkozem within the sediments represented in column 1 varies from medium (layer 2) and light (layers 3 and 4) loam to loamy sand (layers 5 – 9, and 14.3) and sand (layers 10 – 14.2). In all the studied sediments, fractions of 0.05 – 0.01 mm and < 0.001 mm dominate the melkozem freed from carbonates. Also a number of interlayers can be singled out where a relative accumulation of the specified granulometric fractions takes place (Fig. 2). The most considerable relative maximum content of fractions of 0.05 – 0.01 mm has been registered in layers 2, 5.1, 7, 10, 13.3 and in the upper part of layer 14.3. Relative accumulation of fractions of < 0.001 mm has been observed in the bottom part of layer 2 as well as layers 4, 12.1, 13.1, 13.3, and 14.3 (except for the interlayer in the middle part of the last).

The whole sequence of sediments is characterized by a considerable content of calcium carbonates (Fig. 2). Their content is at a minimum in layers 2, 15 and 17.

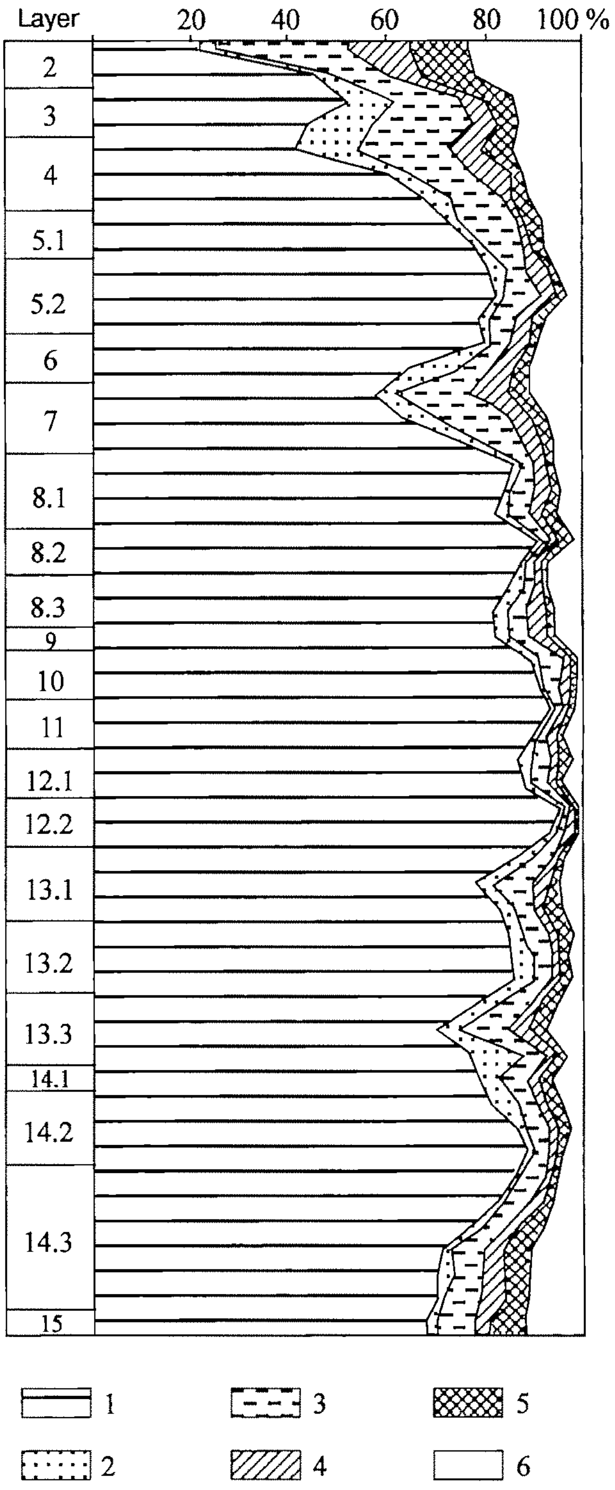

Fig 1 Granulometric composition of melkozem in the Obi-Rakhmat deposits (square Ж-8, column 1)

1 – a loss from HCl treatment, %, *2* – *6* – percentage of fractions with the diameter (mm) *2* – 1 – 0.05, *3* – 0.05 – 0.01, *4* – 0.01 – 0.005; *5* – 0.005 – 0.001, *6* – < 0.001

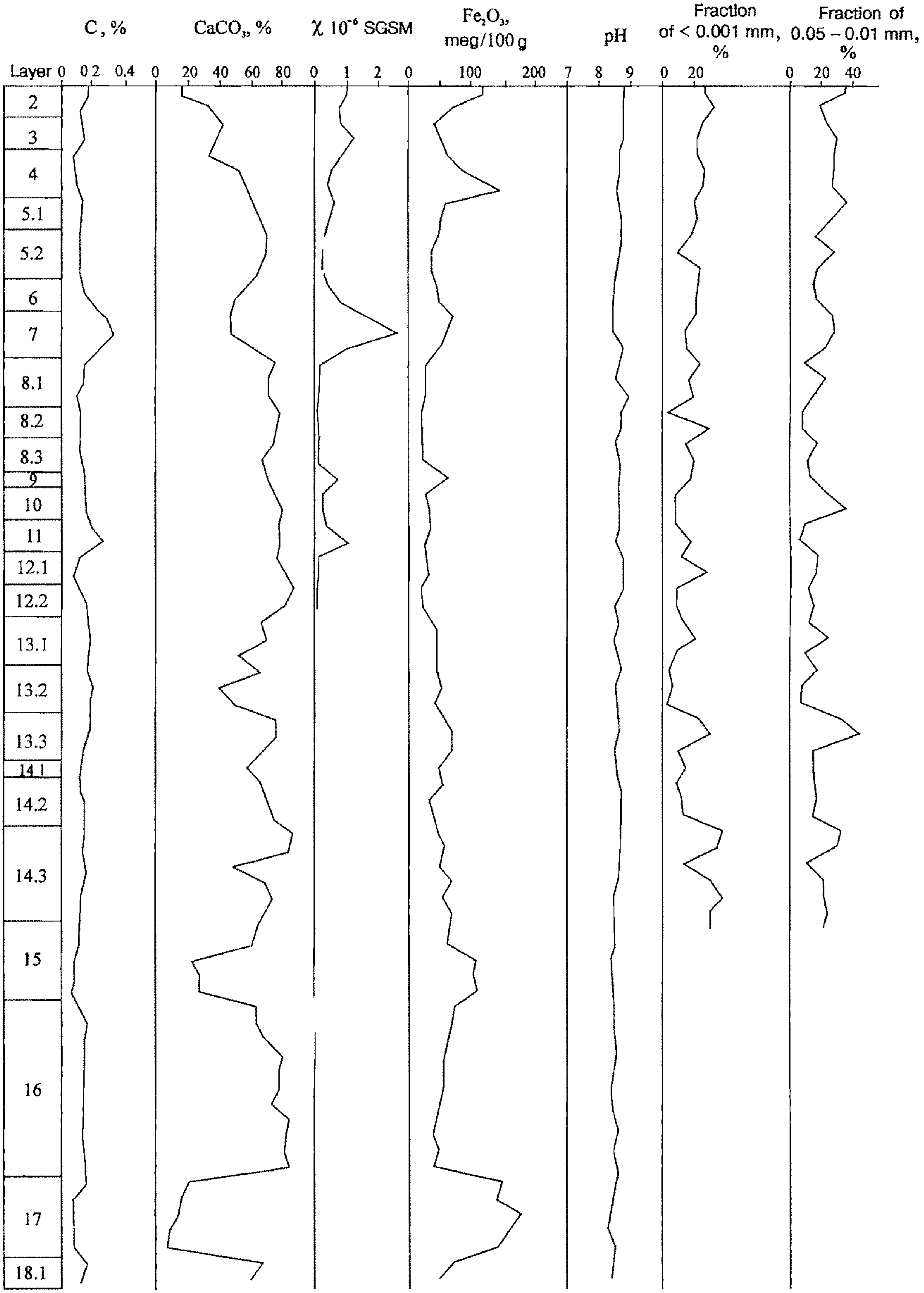

Fig. 2 The main characteristics of the substance composition of melkozem in the Obi-Rakhmat deposits.

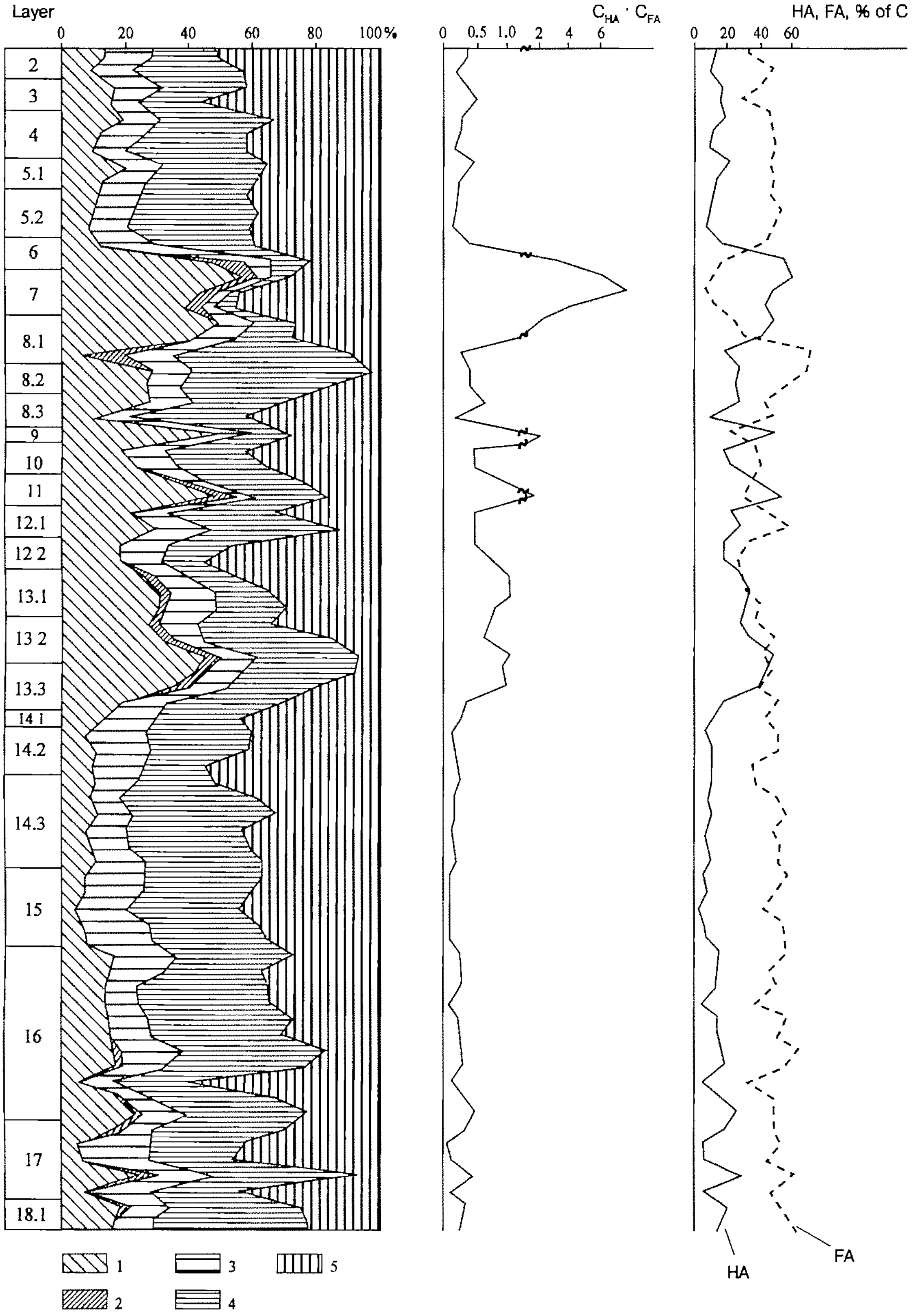

Fig. 3 Humus composition of melkozem in the Obi-Rakhmat deposits (% to C).
1 – HA-1 + HA-2; *2* – HA-3, *3* – FA-1a, *4* – FA-1 + FA-2 + FA-3, *5* – non-hydrolysable forms

Furthermore, a relative decrease in the carbonate accumulation connected with an increase in the share of the humic acid in humus has been detected in layers 7, 13.1 and 12.2, which can indirectly serve as a piece of evidence to the increase of humidity of climate and thus the intensity of humus formation processes.

The value of pH of water extracts of the sediments under study lies within the alkali zone, with an insignificant increase from the foot to the roof of the sediments (Fig. 2).

Specific magnetic susceptibility of melkozem c significantly changes from layer to layer. The value of c for the deposit least influenced by soil formation processes is minimal, equaling $0.03 - 0.05^{-6}$ SGSM per 1 g. When the processes of soil formation were more active, the value of this indicator increased 7 times (layer 9), 10 times (layer 11) and more than 20 times (layer 7).

The content of different forms of iron presents one of the most important characteristics of the chemical composition of sediments, reflecting the direction of the pedogenic processes. Within the limits of the sedimants under study, this indicator varies considerably (Fig. 2). The largest accumulation of amorphous iron was detected in layer 17, where the amount of Fe_2O_3 reaches 150 – 180 meq per 100 g of the melkozem. In addition, in a number of layers and sublayers, for example, 7, 9, 13.3, relative accumulation of iron can be observed. Here an increase in the amount of accumulated amorphous forms of iron is associated with the increase in the specific magnetic susceptibility of sediment (Fig. 2).

On the whole, the sediments are not salinized. The quantity of easily soluble salts does not exceed 0.05 – 0.06%, though slightly increasing in the upper part of the sediments (layers 3 and 4) to 0.07 – 0 10%. Among the anions HCO_3^- dominates, with Ca^{2+} dominating among the cations.

The amount of humic substances in the Obi-Rakhmat sediments is small. In layers with the highest level of carbon accumulation, its content is less than 0.4% (layers 7, 11). In the rest of the rock mass the carbon content is within 0.1 – 0.2% of the mass of the melkozem.

In the lower part of the sediments under study (layers 14 – 18) humus largely consists of fulvic acid, while the ratio of fulvic acid carbon to the humic acid carbon ($C_{HA} \cdot C_{FA}$) does not exceed 0.5 (Fig. 3). Sublayers with relative (inconsiderable) increase in the share of humic acids (HA) in humus can be singled out. The upper portion of the sediments (layers 2 – 13) is distinguished by a large humus content, as well as a high content of HA. Here, layers and sublayers have been detected where humic acids dominate over fulvic acids (FA), while the ratio $C_{HA}:C_{FA}$ exceeds 1.0 (layers 13.3, 13.1, 11, 9, 7). In the last layer this indicator reaches abnormally high values of 4.0 to 7.5.

Among the humic acids calcium humates, fraction HA-2, dominate (Fig. 3). Humic acids combined with clay minerals (HA-3), have been detected only in some of the layers and sublayers which were forming during a more active stage of soil formation processes, accompanied by the accumulation of humic substances, amorphous iron, an increase in specific magnetic susceptibility, etc. Among the fulvic acids the largest share belongs to the forms combined with calcium humate (FA-2), although the amount of mobile fulvic acids (FA-1a) is also large (their content amounts to 13% of organic carbon on average (or 29% of the total amount of fulvic acids), while sometimes reaching values of 20 – 25%).

The heterogeneity in the combination of pedogenic features, as well as the nature of their change within the sediments under study, is caused by the evolution of factors in soil formation and are connected with the stages of pedogenesis proceeding under different natural conditions. It makes it possible to distinguish the peculiarities in soil formation processes at different layers, as well as to reconstruct the evolution of bioclimatic conditions over a period corresponding to the time of formation of the sequence of sediments mass under study.

Evolution of the conditions of soil formation and the natural environment

The general bioclimatic situation in the site environs was characterized by a considerable degree of contrast between the hydroclimatic factors, high heat supply and the dominance of arid conditions.

A series of radiocarbon dates obtained for the sediments of the Obi-Rakhmat Grotto (Derevianko et al., 2001) made it possible to calculate approximate limits of drastic changes in climatic conditions as well as to reconstruct the evolution the natural environment underwent over specific time intervals (see Table).

I. The layers 18 – 15, 14.3 and 14.2 correspond to the time period of over 48,000 ± 2400 years BP (see Fig. 1 – 3, Table). Over this period of time the soil formation directionality was changing with the result that the following paleosoils were being formed (analogs of modern soils with corresponding humus characteristics): mountain-meadow subalpine (layer 18) → ordinary sierozems → brown mountain-forest → ordinary sierozems (layer 17) → brown mountain-forest (layer 16). Then the forest soil formation gave way to sierozem formation, which was characterized by inconsiderable fluctuation in humidification, with a background of general considerable climate aridity. Because of this, in parallel with analogs of modern sierozems, another subtype was discovered – dark sierozems, which were formed under relatively more humid conditions. The dominance of sierozems is traced up to layer 14.2.

Changes in pedogenic features and soil formation conditions during the Middle Würm (W_2)

Layer	Sample	Analogs to modern soil types according to humus formation	Primary pedogenic features associated with humus formation				Soil formation conditions	
			C_{HA}	C_{FA}	$C_{HA} : C_{FA}$	H/C	Average annual temperature, °C	Annual precipitation, mm
5.1	27	Dark sierozem	20.1	44.6	0.45	–	8 – 10	400 – 600
	26		12.2	48.8	0.25	1.01		
5.2	25	Ordinary sierozem	10.9	46.5	0.23	1.27	10 – 13	300 – 500
	24		9.1	52.6	0.17	–		
	23		7.3	50.7	0.14	–		
6	22	Dark sierozem	16.8	43.2	0.39	–	8 – 10	400 – 600
	21	Mountain black-brown	56.5	21.1	2.68	0.76	7 – 9	600 – 900
7	20	No analogs in modern soils	61.5	10.2	6.03	0.60	Combination of heat and moisture optimal for soil formation	
	19		48.3	6.4	7.50	0.70		
	18		43.4	10.9	3.98	0.69		
8.1	17	Mountain black-brown	48.9	24.4	2.00	–	7 – 9	600 – 900
	16		41.6	29.8	1.39	0.86		
	15	Dark sierozem	18.2	72.1	0.25	–	8 – 10	400 – 600
8.2	14		27.9	69.7	0.40	1.16		
	13		25.8	56.6	0.46	–		
	12		17.2	49.2	0.35	1.18		
8.3	11	Brown carbonate	27.3	42.0	0.65	–	8 – 9	450 – 550
	10	Ordinary sierozem (?)	8.4	48.8	0.17	–	10 – 13 (?)	300 – 500 (?)
9	9	Mountain black-brown	50.0	22.3	2.24	0.78	7 – 9	600 – 900
10	8	Brown mountain-forest	18.0	39.5	0.46	0.99	5 – 8	900 – 1100
	7		21.9	41.8	0.52	–		
11	6		35.7	39.8	0.90	–		
	5	Mountain black-brown	54.1	28.7	1.88	0.73	7 – 9	600 – 900
12.1	4	Brown mountain-forest	21.2	45.2	0.47	–	5 – 8	900 – 1100
	3		28.6	59.2	0.48	–		
12.2	2	Brown leached	17.9	35.0	0.51	1.17	8 – 9	550 – 650
	1		18.2	25.5	0.71	–		
13.1	35	Brown typical	28.3	26.7	1.06	0.92	8 – 9	500 – 600
	36		33.7	31.0	1.09	–		
	37		31.8	39.1	0.81	0.96		
13.2	38	Brown carbonate	28.3	37.0	0.76	–	8 – 9	450 – 550
	39		33.3	51.2	0.65	–		
	40	Brown typical	49.4	43.4	1.13	–	8 – 9	500 – 600
13.3	41		44.5	47.7	0.93	–		
	42		40.0	40.6	0.98	1.12		
	43	Dark sierozem	17.9	52.1	0.34	–	8 – 10	400 – 600
14.1	44		12.5	43.2	0.29	–		
14.2	45		13.5	55.7	0.24	–		
	46	Ordinary sierozem	10.0	48.6	0.21	–	10 – 13	300 – 500
	47		8.7	36.0	0.24	–		
14.3	48		10.0	38.0	0.26	–		
	49		8.6	41.4	0.17	–		
	50		10.7	56.6	0.19	1.08		
	51		6.9	49.4	0.17	–		
	52		7.7	51.6	0.15	–		
	53		10.0	53.3	0.19	–		

II. Layer 14.1 was dated from 48,800 ± 2400 years BP (see Fig. 1 – 3, Table). Soils in this layer were formed in the same way as the underlying sediments (layer 14.2); humus formation corresponded to that of modern sierozem. Annual temperature averaged between +8 ... +10 °C; precipitation reached an annual level of 400 – 600 mm.

III Pedogenic features of layers 13.3 – 12.2 make it possible to diagnose the presence of analogs to modern brown soils, which are formed at an average annual temperature in the range of +8. . +9 °C but at a different level of precipitation, reaching 500 – 600 mm a year for the analogs of brown soils, 450 – 550 mm for the analogs of brown carbonate soils, and 550 – 650 mm for brown leached soils (see Table).

IV. Sediments between layer 13.2, dating from > 46,000 years BP, and layer 8.2, dating from 44,000 ± 2000 years BP, were formed under changing bioclimatic conditions. Analogs of typical brown soils (layer 13.1) gave way to the leached subtype (layer 12.2), which could form under more humid conditions than the previous soils Then they gave way to the analogs of brown mountain-forest soils (layer 12.1), which alternated in time with mountain black-brown soils that form under an optimal combination of heat and moisture supply (layers 11 and 9). Average annual temperature ranged between +8...+9 °C (brown typical and leached soils) and +5... +8 °C (brown mountain forest soils). The precipitation level ranged between 500 – 600 and 900 – 1100 mm a year. While the soils, whose pedogenic features are analogous to modern mountain black-brown soils, were being formed, annual temperature averaged between +7 and +9 °C, while the precipitation level reached 600 – 900 mm per year.

V. The pedogenic features of layer 8.2 and the bottom of layer 8.1 correspond to the process of sierozem formation and the dark sierozem subtype, which are formed under somewhat warmer and more arid conditions than those necessary for the formation of brown carbonate soils (+8... + 10 °C with annual precipitation level of 400 – 600 mm) that precede them.

VI. The next portion of the sediments – layers 8.1, 7 and the bottom part of layer 6 – differs markedly from others. It is suggestive of an optimal combination of heat and humidity. No analogs to layer 7 in the soil cover of the given and neighboring zones having been found (see Table). A radiocarbon date of 41,400 ± 600 BP was obtained for this layer, which makes it possible to correlate the warm episode recorded in this layer with the early stages in the Middle Würm optimum.

VII. The sediments in the upper part of the profile attest to the fact that the conditions were gradually becoming more arid, with a new start in sierozem formation. The dark sierozems (the upper part of layer 6) gave way to ordinary sierozems (layer 5.2), and then they changed into dark subtypes (layer 5.1). Average annual temperatures rose, while the precipitation level decreased; while layer 5.2 was being formed the precipitation level amounted to only 300 – 500 mm per year (see Table).

Thus, the fluctuations in the climatic characteristics generally lay within the warm to moderately warm interval. The temperature changed considerably only in accordance with global climatic changes, while the humidification changed more often and with greater amplitude of characteristics.

Conclusion

Preliminary studies, the results of which have been published, have made it possible to formulate the trend of changes in climatic conditions caused by both global changes and regional variations over the period of sediment formation in the Obi-Rakhmat Grotto (Derevianko et al., 2001). New results on the study of pedogenic characteristics in the sediments of the Obi-Rakhmat Grotto presented in this article made it possible to support the validity of conclusions made previously, as well as to reconstruct certain quantitative climatic indicators for the first time.

First, the study of the pedogenic features of the Obi-Rakhmat Grotto demonstrated that the bioclimatic conditions in the area during the Middle Würm interglacial period correspond to modern landscapes of subtropical desert steppes and semiarid lands of piedmont areas of western Central Asia. At the same time, a number of layers were being formed in another natural environment – light forest and forest associations, which presently occupy higher positions in the system of vertical zoning in the Western Tien Shan.

Three doubled podocomplexes isolated in the sediments of the Obi-Rakhmat site, formed under warm climatic conditions as well as humid conditions favorable for humus formation and humus accumulation, differ at the level of quantitative indicators. Pedogenic features of layer 7, whose analogs in modern soil cover of the given and neighboring zones has not been found, attest to the existence of an exceptional combination of heat and humidity factors in the period of its formation. Using radiocarbon dates and the results of the study of pedogenic features of the deposits, it can be supposed that the climatic optimum for this region fell within the time period corresponding to the early stage of the Middle Wurm optimum (W_2, 42,000 – 41,000 years BP).

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RECENT INVESTIGATIONS OF PALEOLITHIC SITES IN THE JEOLLA PROVINCE (SOUTHWESTERN KOREA) AND THEIR SIGNIFICANCE

Introduction

Paleolithic artifacts found at a seaside hill near Suncheon in the Jeolla Province were first reported in 1962 (Sample, Mohr, 1964). However, no relevant illustrations or maps of the locality have been left. Moreover, the location of the site is unclear, though a general picture of the site is available.

Over the last quarter of a century, much systematic research has been done in the region. Excavations conducted during the late 1980s in the area submerged by the Juam Dam in the Middle Boseong River deserve special mention. These investigations revealed the presence of important Paleolithic evidence in the Jeolla Province. However, the distribution of Stone Age assemblages was not limited to the Boseong River basin. They have also been recorded along the Seomjin River. Excavations conducted at the Gokcheon (Lee Y.J. et al., 1985; Lee Y.J., Yoon Y.H. 1990), Geumpyeong (Lim P.T., Yi S.B., 1988), and Juksan (Yi S.B., Kang H.S., Lee K.D., Kim Y.H., Seong C.T., 1990) sites at Suncheon City as well as at the Daejeon site in Hwasun County (Lee Y.J., Yoon Y.H., 1992), the Jusan-ri and the Songjeon-ri sites in Gokseong County (Yi S.B., Kang H.S., Lee K.D., Lee S.H. et al., 1990) have revealed additional occurrences of Paleolithic culture in the Jeolla Province.

In 1993, Paleolithic artifacts were discovered in the alluvial fan at the Sanwol-dong site, Gwangju City, on the Middle Yeongsan River (Lee G.K., 1995). In 1996, Paleolithic artifacts were found in a Pleistocene layer at the Chipyeong-dong site, Gwangju City (Lee G.K. et al., 1997). New aspects of spatial distribution of Paleolithic assemblages in the Yeongsan River Basin have been investigated. Moreover, through continuous surface surveys, 78 newly discovered Paleolithic sites in the Jeolla Province were reported by 2000 (Lee G.K., 1997a, b; Lee G.K., Kim E.J., 1999; Lee H.J., 1997; Choi S.R. et al., 1997; The Site Map…, 2000). These discoveries have demonstrated that Paleolithic cultures were spread all over the Jeolla Province.

Since 1996, more Paleolithic sites have been systematically excavated: Jungnae-ri (Lee G.K. et al., 2000) and Wolpyeong (Lee G.K., 2000) at Suncheon City; Dosan in Hwasun County (Lee G.K., 1999); Wondang, Majeon, and Gundong in Yeonggwang County (Lee G K., 2001a); and Danghasan in Hampyeong County (Lee H.J., 2001). These investigations shed new light on the Stone Age cultures of the Jeolla Province. In terms of stratigraphy, thickness of Pleistocene deposits exceeds 5 m at some of the sites; the succession of the deposits possibly represents the cultural development from the Middle to Upper Paleolithic in the region.

Archaeological investigations were continued in 2000. The vast Upper Paleolithic site of Jingeuneul was excavated in the upper reaches of the Geum River in Jinan County (Lee G.K., 2001b). In addition, five surface occurrences of Paleolithic artifacts were discovered in the Iksan region (Lee H.W., Lee Y.D., 2000).

In the following discussion, the issue of Paleolithic cultures in the Jeolla Province is examined in terms of spatial distribution pattern, stratigraphy, and functional types of sites, as well as the variability of lithic artifacts.

Spatial distribution of the sites

In the Jeolla Province, Paleolithic sites can be encountered almost everywhere, from hilly areas to mountains (Fig. 1). For example, such sites as Jingeuneul (Fig. 2), Jungnae-ri (Fig. 3), and Wolpyeong (Fig. 4) are located in mountains, while Wondang, Gundong, Majeon

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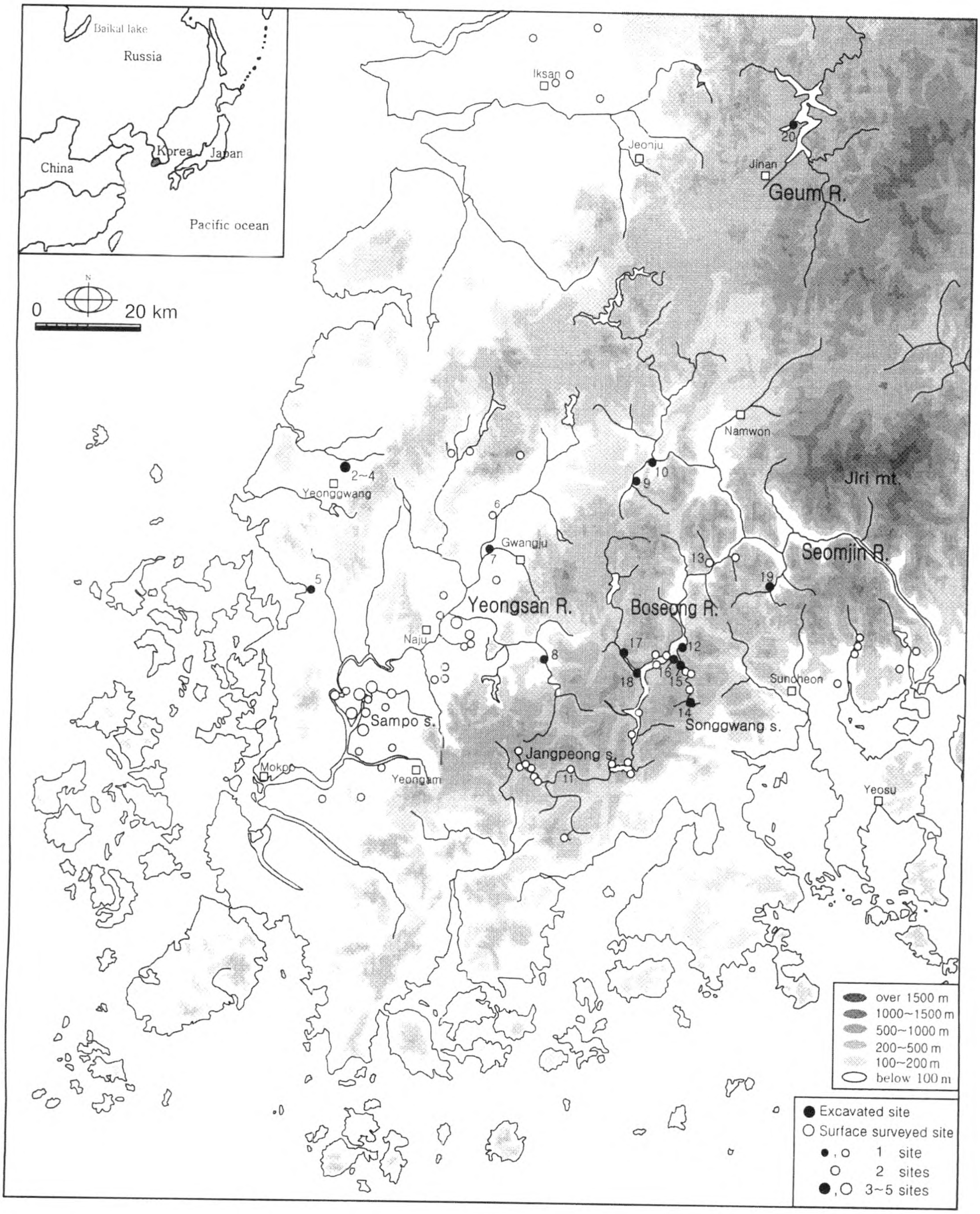

Fig. 1. Map showing the location of Paleolithic sites in the Jeolla Province.
1 – Mildeung, *2* – Majeon, *3* – Gundang, *4* – Wondang, *5* – Danghasan, *6* – Sanwol-dong, *7* – Chipeong-dong, *8* – Dosan, *9* – Jusan-ri, *10* – Songjeon-ri, *11* – Yongso, *12* – Geumpeong, *13* – Taepyeong, *14* –Wolpyeong, *15* – Juksan, *16* – Gokcheon, *17* – Daejeon, *18* – Hajuk, *19* – Jungnae-ri, *20* – Jingeuneul.

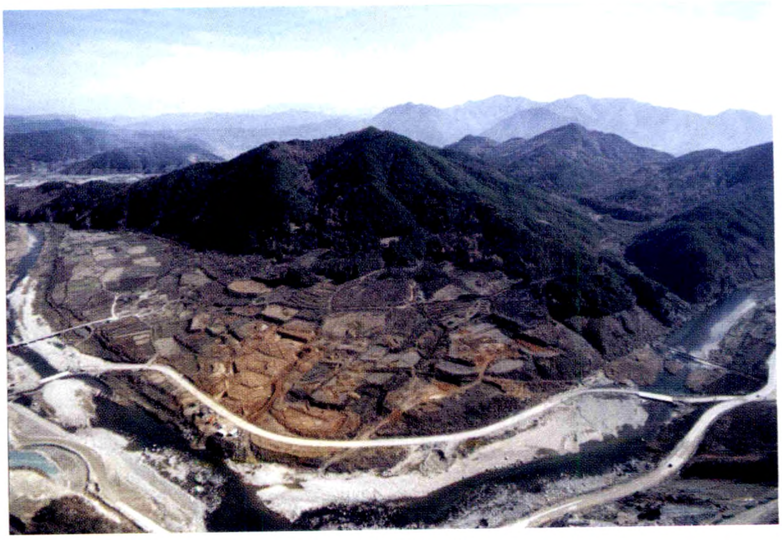

Fig. 2. Aerial view of the Jingeuneul site.

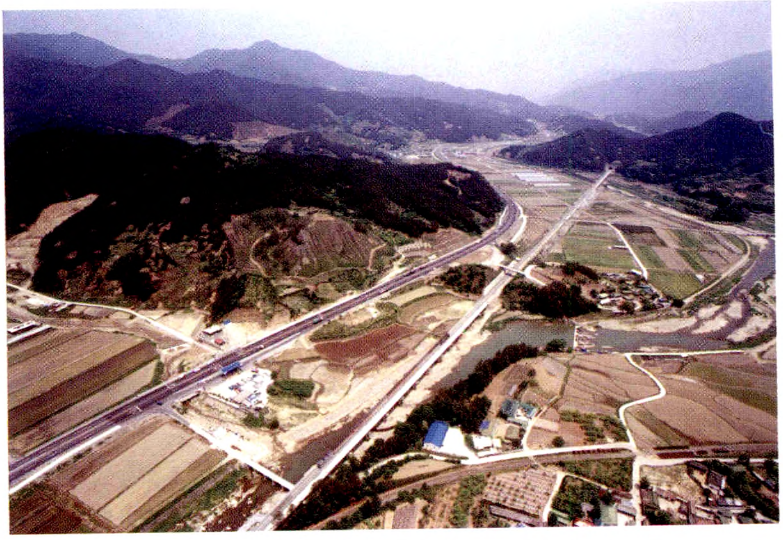

Fig. 3. Aerial view of the Jungnae-ri site.

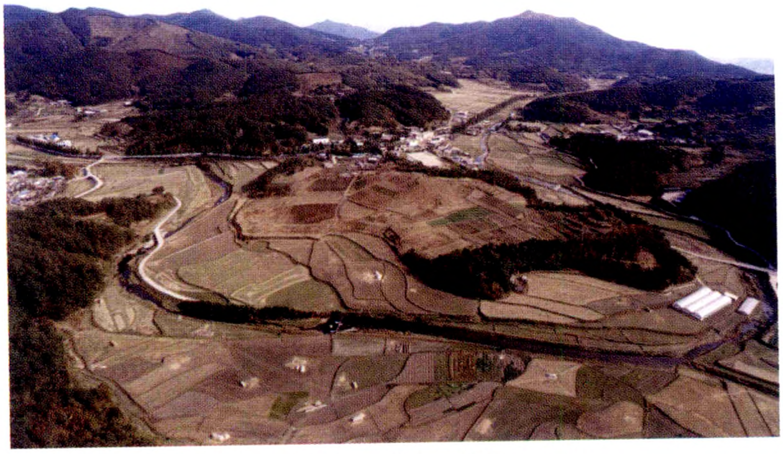

Fig. 4. Aerial view of the Wolpyeong site.

(Fig. 5), and Danghasan are situated in hills. Such sites as Dosan (Fig. 6) and Chipyeong-dong occupy an intermediate zone. Many Paleolithic localities have been discovered through field surveys in the Naju and Yeongam regions.

The sites can be subdivided into four groups according to their position within river systems: (1) sites located in river meanders, e.g., Wolpyeong (Suncheon City) and Yongso (Boseong County); (2) sites located upon the confluence of rivers, e.g., Jungnae-ri (Suncheon City) and Taepyeong (Gokseong County); (3) sites located on river banks, e.g., Jingeuneul (Jinan County); and (4) sites located in river basins, e.g., Mildeung (Jangseong County) (Lee G.K., Kim E.J., 1999).

Many sites are clustered in the Songgwang, Jangpyeong, and Sampo river basins in particular, indicating that Paleolithic people tended to inhabit various riverside areas. Investigation of these sites has enabled us to reconstruct the spatial limits of the sites, contacts and trade activity, and furthermore, the complex behavior of the sites' prehistoric inhabitants.

Stratigraphy and related Paleolithic features

Active research has been done on the formation of Pleistocene deposits and relative chronology in the region under consideration (Lee D.Y., Kim J.Y., 2000; Kim J.Y., Yang D.Y., 2001). This paper will discuss the sites that contained a significant amount of contextual information associated with culture-bearing layers: Jungnae-ri, Jingeuneul, Dosan, Wondang, Wolpyeong, Yongho-dong, and Noeun-dong (Han C.G., 2000a, b, 2001).

A description of stratigraphic sequences at the above-mentioned sites and their correlation with corresponding cultural contexts is shown in the Table. In the Jingeuneul and Jungnae-ri stratigraphic profiles, clay deposits are separated by additional layers, mostly consisting of angular rock fragments or gravel.

Judging from the available radiocarbon dates and the analysis of lithic industries, it may be conjectured that the pale brown and dark brown clay layers belong to the Upper Paleolithic, while the brown, red-brown, and yellow-brown layers are related to the Middle Paleolithic.

At the majority of the investigated sites, the Upper Paleolithic horizons are normally deposited at a depth of one meter below the modern surface (Jingeuneul, Wolpyeong, Jungnae-ri). The exception is the Yongho-dong site, where four separated cultural layers were found 1.7 m below the topsoil (Han C.G., 2000a). The Middle Paleolithic horizons occur at a depth of in 3 – 5 m below the modern surface. This phenomenon probably explains why the majority of Upper Paleolithic artifacts were found within the cover sediments. Thus it should be expected that artifacts older than the Upper Paleolithic could be recovered at a greater depth.

Lithic variability

Raw materials. Raw materials are an important source of information for understanding the procurement area, contacts, and trades practiced by the sites' inhabitants. The raw material usage pattern and the location of raw material sources with regard to the site are of great importance to gaining insight into human acquisition behavior (Lee H.W., 2001).

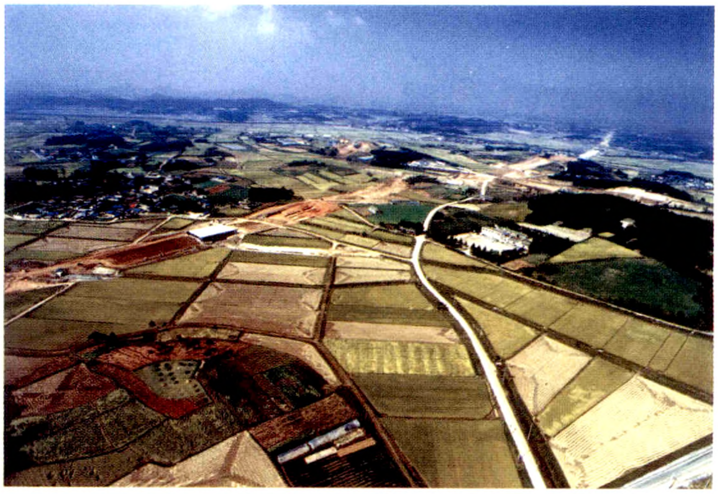

Fig. 5. Aerial view of the Majeon, Gundong, and Wondang sites.

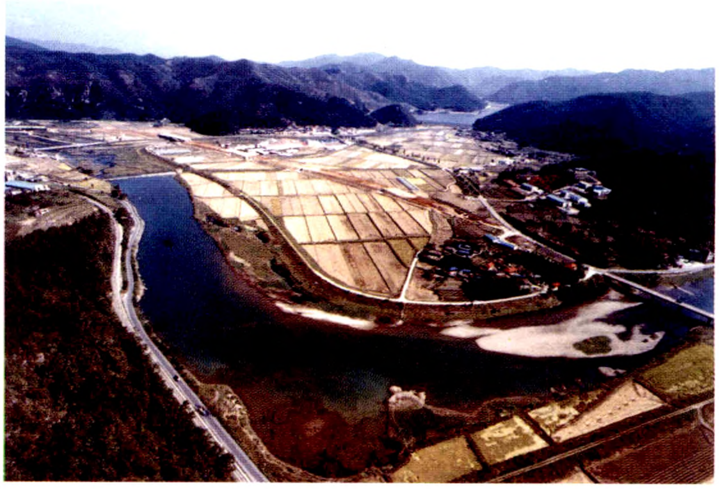

Fig. 6. Aerial view of the Dosan site.

Correlation between the stratigraphic profile and the cultural context

Geological profile	Cultural context
1. A pale brown clay layer	The Microblade Culture at the Wolpyeong and the Noeun-dong sites The Blade Culture in cultural layer 4 of the Jungnae-ri site The Blade Culture at the Jingeuneul site with a ^{14}C date of 22,850 ± 350 BP (SNU01-028)
2. A dark brown clay layer (with a soil-wedge formation)	^{14}C date for the upper part of the layer at the Noeun-dong site: 22,870 ± 110 BP Cultural layer 2 of the Yongho-dong site ^{14}C date below cultural layer 2: 38,500 ± 1000 BP
3. A brown clay layer	Cultural layer 3 of the Yongho-dong site Main cultural layer of the Dosan and Wondang sites
4. A red-brown clay layer (with a soil-wedge formation)	Cultural layer 1 of the Jungnae-ri site
5. A yellow-brown sandy clay layer	–
6. Gravel, sand, silt layer under alluvial or colluvial context	–
7. Bedrock	–

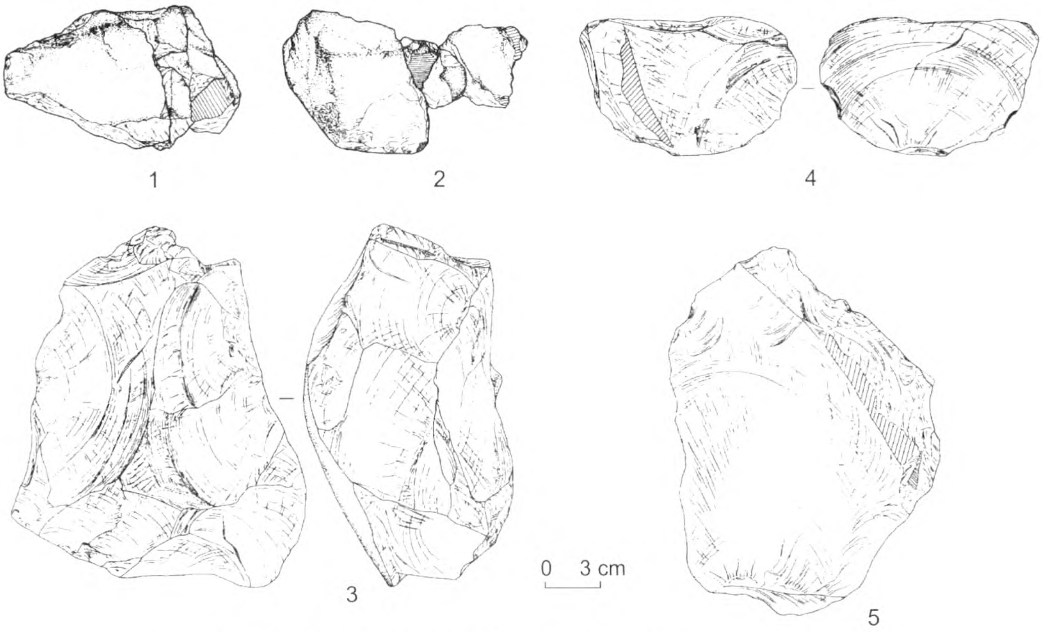

Fig. 7. Cores and flakes from cultural layer 1 of the Jungnae-ri site.
1, 2 – refitted vein quartz cores and flakes; *3* – tuff core; *4, 5* – medium and large tuff flakes.

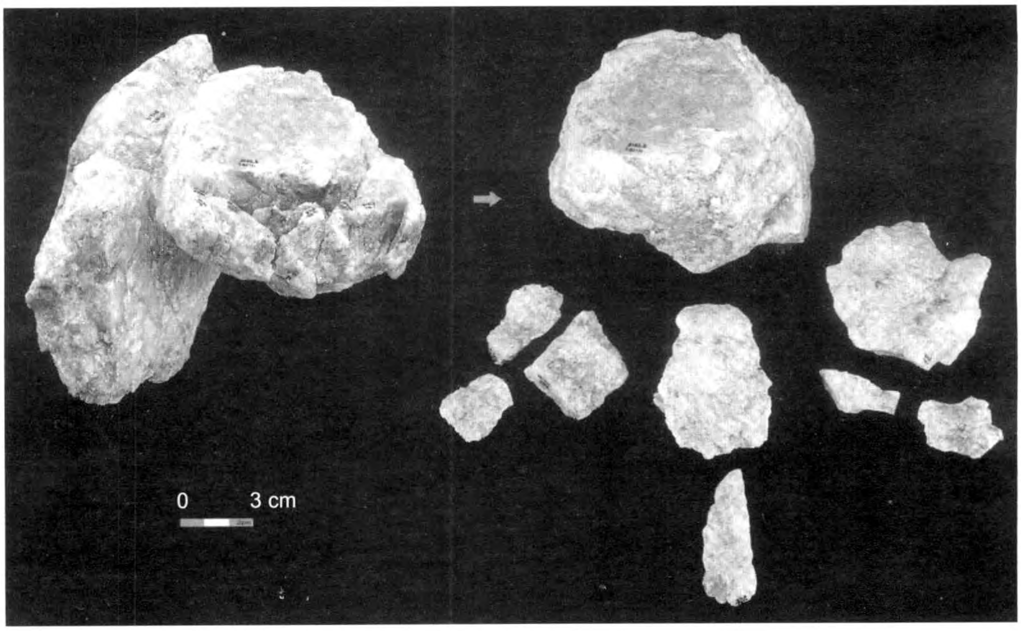

Fig. 8. Refitted vein quartz core and flakes (cultural layer 1 of the Jungnae-ri site).

Throughout the Middle to the Upper Paleolithic period, inhabitants of the Jungnae-ri site used gravel for making tools. They brought this raw material from the Whangjeon Valley, located adjacent to the site (Lee Y.S., 2000). Rhyolite found at the Wolpyeong site was probably transported either from a source located at a distance of approximately 10 km, near Donggwangyang City, or from the Boseong River. These data are suggestive of the raw material transportation pattern, though the source has not yet been precisely identified.

There were changes in raw material selection from the Middle to Upper Paleolithic. At the Jungnae-ri site, vein quartz and tuff were used during the Middle Paleolithic, while during the Upper Paleolithic rhyolite, sandstone, shale, and fine-grained vein quartz were utilized along with the materials used previously. A lot of artifacts made of hyaline quartz were found at the Wolpyeong site. Fine-grained rhyolite, obsidian, and hyaline quartz are normally much harder than tuff. It seems that in the Upper Paleolithic these materials were mostly used for manufacturing new kinds of lithic tools such as blades.

Artifacts made of obsidian have been found in the Gangwon, the Gyeonggi and the Chungcheong Provinces, but not in the Jeolla Province yet. The main reason for this is that in these regions people could easily find high-quality rhyolite, so it was used as an alternative raw material.

Analyses of the artifact sizes has demonstrated that large tuff cobbles (exceeding 20 cm in diameter) were used for tool manufacturing in the Middle Paleolithic, while Upper Paleolithic tools were often made using small rhyolite pebbles (about 10 cm in diameter). As time went on, the technology of knapping stones improved, allowing the efficient utilization of small pebbles.

Lithic technologies. Three major primary reduction strategies (flakes, blades, and micro-blades production), as well as several secondary treatment techniques have been identified through the examination of the discovered assemblages.

The flaking sequence can be reconstructed on the basis of refitted cores and flakes made of rhyolite and vein quartz from the Jungnae-ri site.

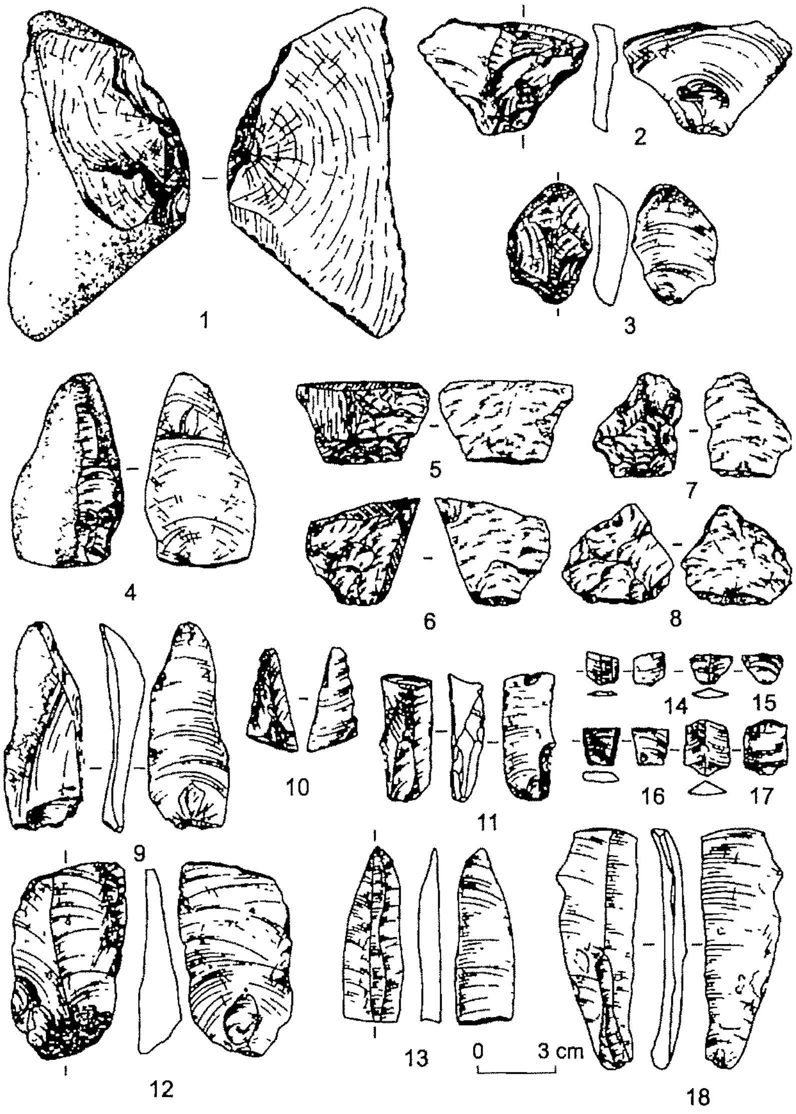

Fig. 9 Upper Paleolithic flakes and blades from cultural layer 4 of the Jungnae-ri site (*1 – 4, 9 – 18*) and from the Wolpyeong site (*5 – 8*).
1 – 8 – flakes with prepared residual striking platform, *9 – 13* – blades produced by direct percussion technique, *14 – 18* – blades produced by indirect percussion technique

Examination of tuff cores and corresponding flakes (Fig. 7, *3 – 5*) has shown that residual striking platforms are plain, slightly curved and partially formed by a scar of previous removal. Toolmakers utilized the scar as a striking platform. The cores demonstrate irregular flaking. Sizes of the flakes are also varied. They can be classified into large (12 cm and larger), medium (7 – 12 cm), and small (7cm and smaller) specimens. Flaking angles on them vary from 100 to 115°. Some flakes show a distinct bulb of percussion This might be a result of inappropriate control of force.

To get flakes larger than hand size, knapping with blanks held in one hand is not technically feasible. Another technique must be applied instead. According to ethnographic evidence from New Guinea, smashing a boulder-sized core held between the legs with a large hammer stone (Schick, Toth, 1993: 246 – 247) could be a solution to the problem. With this knapping method, the toolmakers obtained large flakes. The artifacts from the Jungnae-ri site might have been made in such a way. Scars resulting from preceding removals were utilized as striking platforms for the succeeding removal; successive flaking could have been made in multiple directions.

There were three sets of vein quartz cores and flakes refitted. One of them is a big cobble (18 × 14 × 15 cm), which could be easily held in the hand. At the first stage of the core reduction, the strike was made on a flat, even surface serving as a platform; hammering was done in a downward direction (Fig. 8). Flakes detached from the core are small, with angles of flaking varying from 95 to 105°. Two other cores demonstrate the same method of reduction (see Fig. 7, *1*, *2*). The technique applied here is a typical hard hammer percussion.

Tuff and vein quartz artifacts were found in cultural layer 1. Flakes made of tuff can be subdivided according to their sizes into small (3 – 7 cm long) (38.8%), medium (from 7 to 12 cm) (37.5%), and large (over 12 cm)

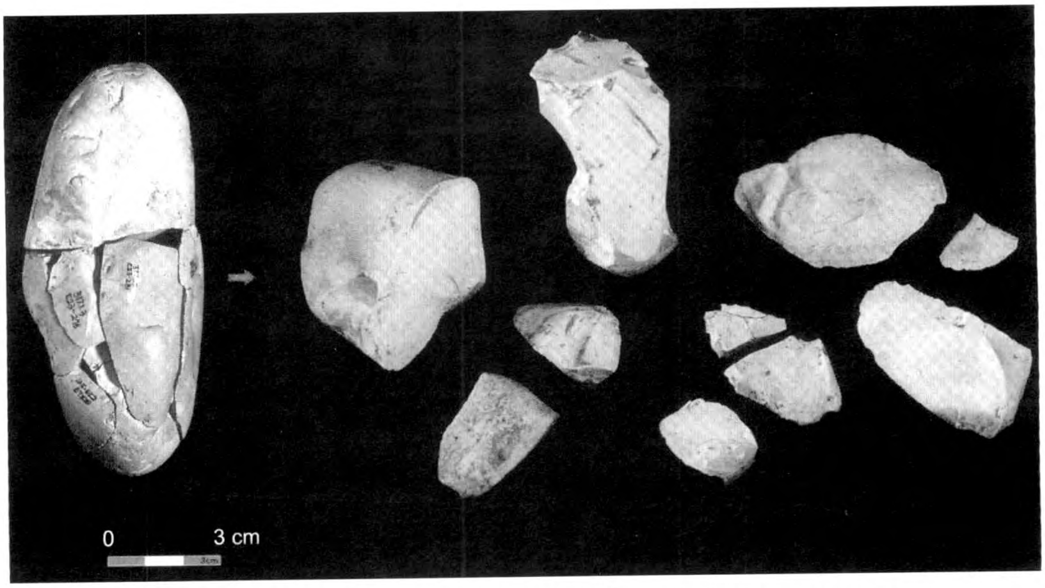

Fig. 10. Refitted rhyolite core and flakes (cultural layer 4 of the Jungnae-ri site).

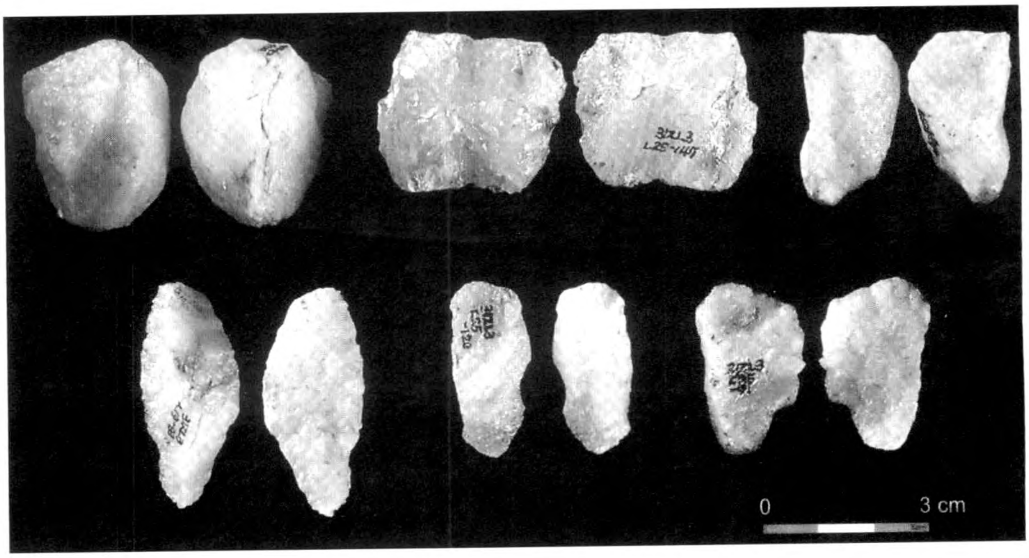

Fig. 11. Cores and flakes produced by bipolar technique (cultural layer 4 of the Jungnae-ri site).

(17.5%). The majority of artifacts made of vein quartz (78.8%) consists of small-sized specimens. These finds represent different types of artifacts and different knapping methods applied to raw materials of various kinds, having been chosen by the toolmakers for various reasons.

The Upper Paleolithic knapping technology could be illustrated by materials derived from Jungnae-ri (cultural layer 4), Jingeuneul, and Wolpyeong.

Comparison of the Middle and Upper Paleolithic flakes has demonstrated that on the latter, the residual striking platforms are smaller, traces of preparation are more distinct, and the bulbs of percussion are less prominent than on the former. These characteristics are suggestive of a technique which was much more advanced than the previous one. These features are observed on flakes made of rhyolite and tuff, and even of high quality vein quartz (Fig. 9, *1 – 8*). It is highly probable that they were knapped with soft hammer percussion.

The overall size of the flakes of vein quartz is smaller. For example, in an artifact collection from cultural layer 1 of Jungnae-ri, 87.6% of all the flakes are smaller than 7 cm, but in cultural layer 4, 98.4% of them are smaller than 7cm and 57.8% of them are even smaller than 3 cm. In the collection of cultural layer 1, 45.5% of artifacts show residual striking platform with a cortex retained and 22.7% of them have no cortex. In the collection from cultural layer 4, these categories are represented by 12.9 and 48.8% respectively. The proportion of non-cortical

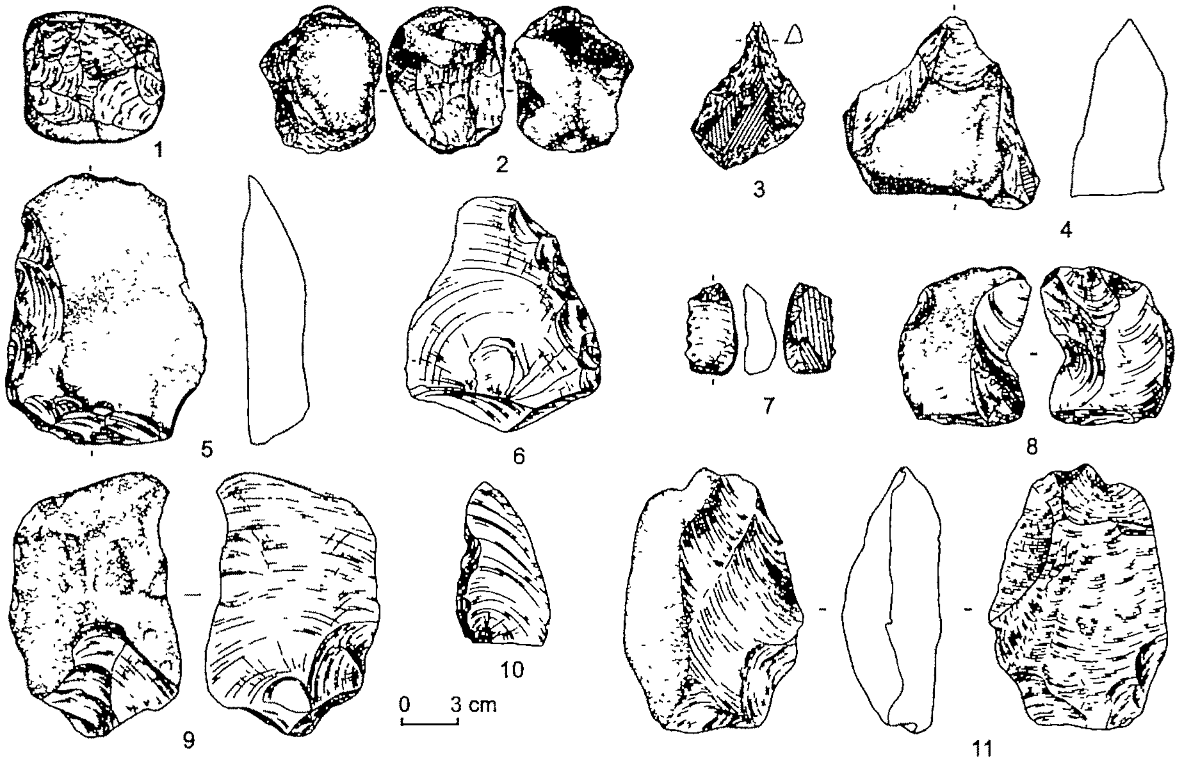

Fig. 12 Tools from cultural layer 1 of the Jungnqe-ri site
1, 2 – polyhedron, *3* – awl, *4* – pick, *5, 6, 10* – side-scrapers, *7* – denticulate, *8* – notch, *9* – cleaver, *11* – biface *1 – 4, 7* – vein quartz, *5, 6, 8 – 10* – tuff

platforms increased while that of cortical decreased as time passed. This shows that the lithic technology had certainly been improved by the Upper Paleolithic.

In cultural layer 4 of the Jungnae-ri site, the rhyolite core and flakes were refitted into a cobble. These artifacts constitute a good source of data for understanding the entire manufacturing sequence. Initially, the middle part of the cobble (10.9 × 4.3 × 5.1 cm) was struck to prepare a platform which then was trimmed in order to get the desired angle between the exterior platform and the flaking surface. Finally the flakes were produced (Fig. 10).

An interesting feature observed on the core is pitted traces located on the opposite side of the flaking surface to which the blow was applied. The traces could be resultant of a blow delivered to the blank resting obliquely on a hard surface like an anvil. The produced flakes here do not show any difference from the flakes detached by typical hard hammer percussion. However, the toolmakers might have used this method to get more flakes from a small blank.

In addition, some high-quality vein quartz artifacts represent the bipolar technique. Sizes of such implements do not exceed 5 cm. The cores have ridges on opposite sides and biconvex shapes in cross section. Flakes are narrow, thin and curve-shaped (Fig. 11). All these features are typical of the bipolar knapping technique (Clark, Kleindienst, 1974).

Two types of blades have been singled out in the Upper Paleolithic assemblage (see 9, *9 – 18*). The first type is characterized by distinct bulbs as well as by thick and wide proximal ends. The other shows slightly swollen bulbs with thin, narrow proximal ends. Blades of the first type were probably made by simple direct percussion, and those of the second type by indirect percussion. The blades having more refined residual striking platforms, representing the first type, could have been manufactured by a soft hammer technique.

The micro-blades found at the Wolpyeong site were made by the pressure flaking technique. This technique is typical and widely known (Inizan et al., 1999).

Two types of secondary treatment – scaled retouch and Clactonian notch – were recorded in cultural layer 1 of Jungnae-ri. In the collections from Jungnae-ri (cultural layer 4), Wolpyeong, and Jingeuneul, the burin blow technique and pressure retouch are observed.

Artifact types. The Middle Paleolithic collection of tools from the Jungnae-ri site includes chopper, chopping tools, bifaces, cleavers, picks, polyhedrons, scrapers, notches, denticulates, and awls (Fig. 12). Choppers, chopping tools, picks, and polyhedrons were made of vein quartz and tuff pebbles, while bifaces and cleavers were made of large tuff flakes. Scrapers, notches, denticulates, and awls were made from flakes and chunks of tuff and

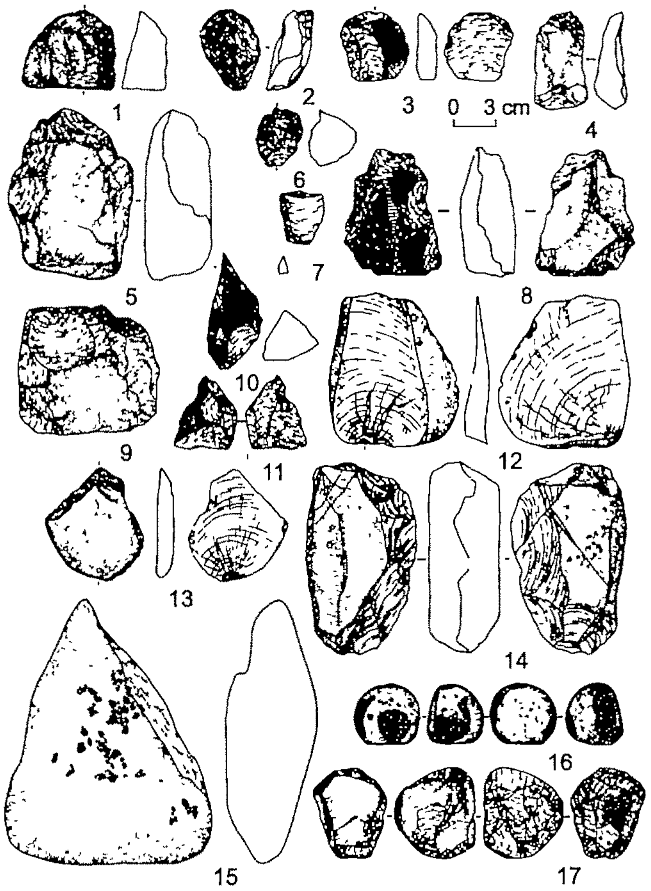

Fig 13 Tools from cultural layer 4 of the Jungnae-ri site
1, 2 – end-scrapers, *3, 4* – denticulates, *5* – chopper, *6* – bec, *7* – side-scraper, *8* – biface, *9* – polyhedron, *10* – awl, *11* – notch, *12* – backed knife, *13* – convergent scraper, *14* – chopping tool, *15* – anvil, *16, 17* – hammerstones

vein quartz. Tools made on large flakes were found at several sites, e.g., Jeongok-ri (Chung Y.W., 1983), Geumpa-ri (Bae K.D., 1999), and Juwol-ri (Yi S.B., Lee G.D., 1993) in the Imjin and Hantan river basins, in western Korea. Artifact assemblages from all of these sites show very similar manufacturing techniques.

The tools from the Dosan and the Wondang sites are considered to be Middle Paleolithic components from the geological and typological point of view. They include choppers, chopping tools, polyhedrons, bola stones, core-scrapers (Clark, Kleindienst, 1974), scrapers, notches, and denticulates. The raw materials applied were mainly vein quartz in pebble forms.

Two types of artifacts that emerged during the Upper Paleolithic are blades and micro-blades. The former type is found in cultural layer 4 of Jungnae-ri (Fig. 13) and at Jingeuneul (Fig 14). Microblades were recorded at Wolpyeong (Fig. 15). For convenience, the former will be called 'Blade Period', and the latter 'Microblade Period'. The tool types characterizing the Blade Period vary from scrapers, burins, beak burins (becs), end-scrapers, notches, denticulates, backed knives, and awls to points, tanged points, choppers, chopping tools, polyhedrons, spheroids, and small bifaces.

The tool types referred to the Microblade Period include microblade cores, bifacial thick points, boat-shaped end-scrapers, nosed end-scrapers, rounded end-scrapers, and also tools from the Blade Period. The Noeun-dong site belonging to this period yields typical burins, microblade cores, and end-scrapers (Han C.G., 2000a).

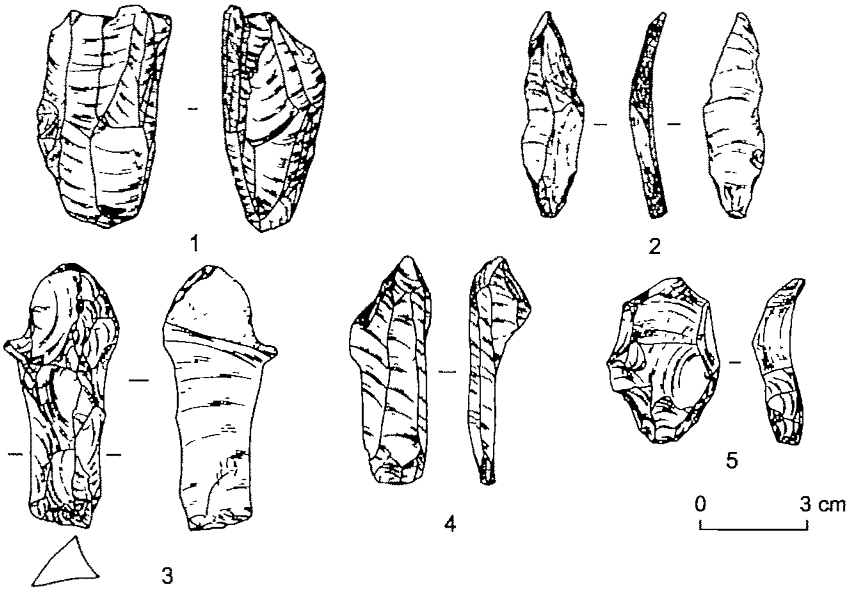

Fig. 14 Blade industry of the Jingeuneul site.
1 – blade core and a blade detached from it, *2* – tanged point, *3* – crested blade, *4* – plunging blade, *5* – rejuvenation flake.

Types of sites

Assemblages from Jungnae-ri, Jingeuneul, and Wolpyeong show many archaeological features in common: a large number of artifacts, complex sets of cultural layers, and additional archaeological features. These sites help to understand such important aspects of prehistoric monuments as lithic technology, usage of fire, differential use of space including arrangement of diverse activity areas. These evidences are conducive to a reconstruction the Paleolithic people's behavior and types of activities.

The four layers at the Jungnae-ri site in total yield not only tools, simple flakes and debris, but also a series of refitting artifacts. They strongly suggest that artifacts were made at the site through the Middle and Upper Paleolithic. It should be noted that more than four sets of stone hammers and anvils of different sizes surrounded by refitting artifacts were recovered from cultural layer 4 (Fig. 16). Such finds are suggestive of the fact that knapping was systematically performed at this site.

Over twenty workshops were recorded at the Jingeuneul site. The sizes of the workshops vary from approximately 0.5 to over 220 sq. m; 80% of the workshops are 0.5 – 20 sq. m wide. The most commonly found tools are tanged points. Moreover, only finished artifacts were unearthed at the Jingeuneul site. Over twenty artifacts, including large end-scrapers, scraper, and

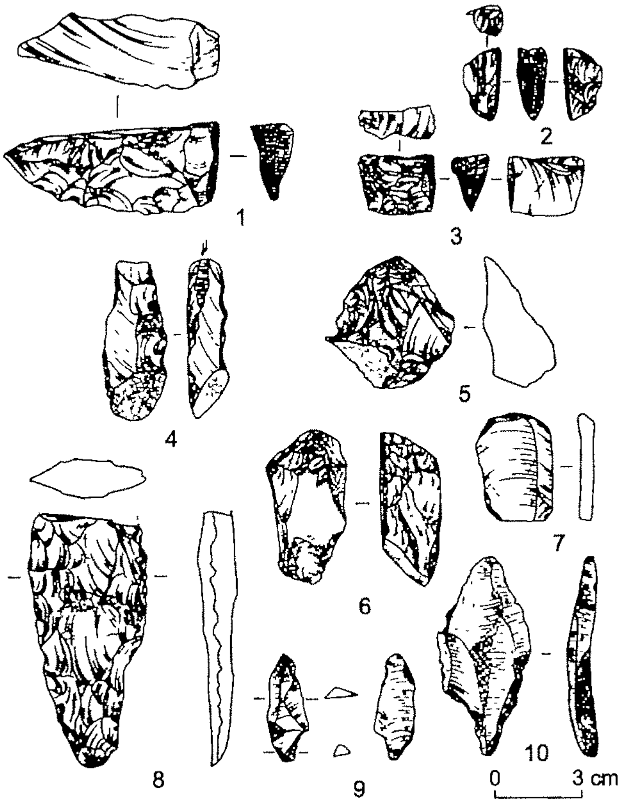

Fig. 15 Microblade industry of the Wolpyeong site.
1 – 3 – microblade cores, *4* – burin, *5 – 7* – end-scrapers,
8 – bifacial thick point, *9, 10* – tanged points

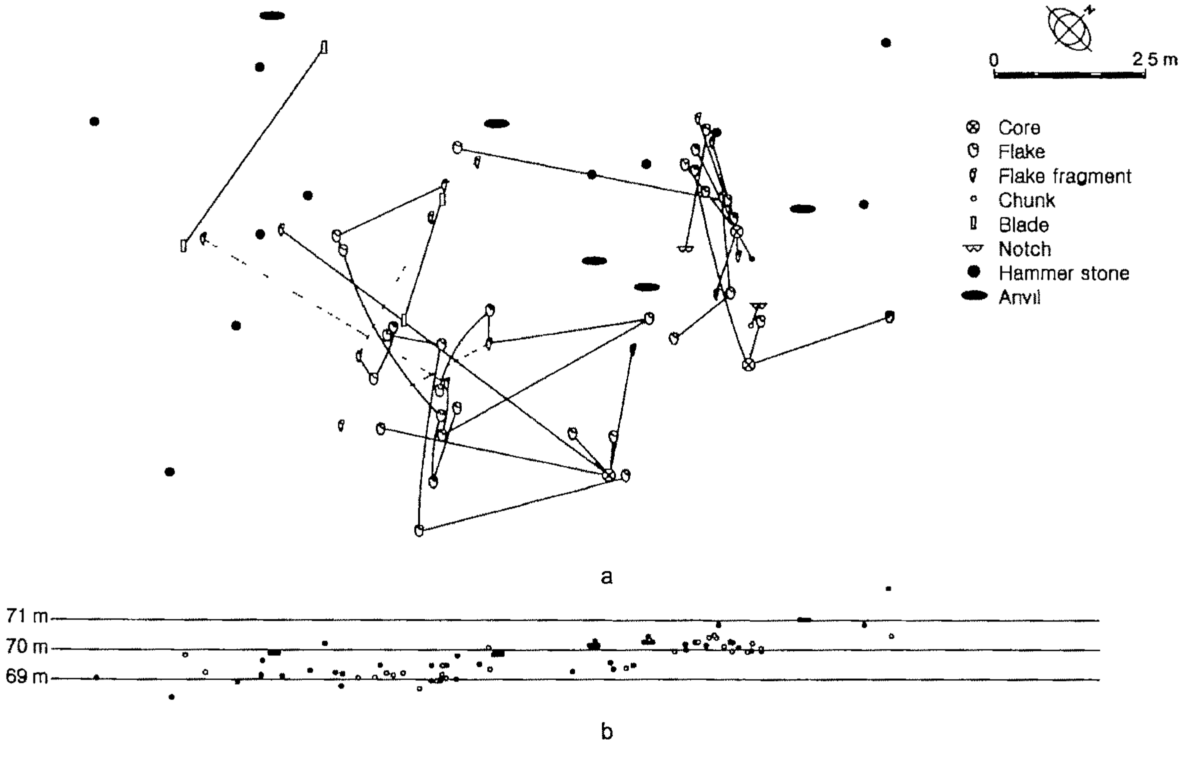

Fig 16 Spatial distribution of hammerstones, anvils and refittable artifacts (*a*) and vertical allocation of the finds (*b*) from cultural layer 4 of the Jungnae-ri site.

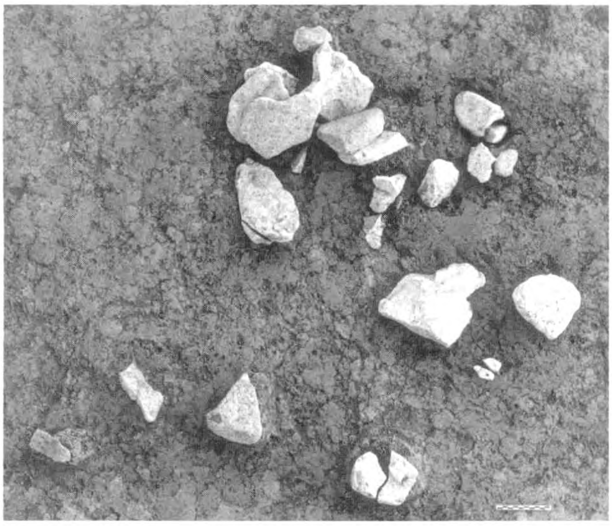

Fig. 17. Hearth N 1 at the Jingeuneul site.

awl, were distributed over an area of 3.5 × 1.8 m. This area might have been used for a specific activity, such as processing animal skins.

In addition, the Upper Paleolithic layers at the Jungnae-ri and the Jingeuneul sites yield burnt stone artifacts. At the Jingeuneul site thermally split stones and charcoal crumbs were found with other artifacts in two separate areas. One of them shows a circular (90 cm in diameter) concentration of artifacts (Fig. 17), while the other represents a more or less disturbed context. In both cases these features represent hearths.

Some of the artifacts and lithics found in cultural layer 4 of Jungnae-ri were subjected to thermal treatment. They include three series of refittable artifacts found in a knapping place (Lee G.K. et al., 2000). The same features were recorded in the Upper Paleolithic layer of the Seokjang-ri (Sohn P.K., 1993) and at Changnae (Park H.H., 1989). These features are suggestive of frequent use of fire by Upper Paleolithic humans.

Taking into account a large site area (ca 70,000 sq. m), a related geographical context, a high density of artifacts, a wide spectrum of tool types, and the existence of imported raw materials, the Wolpyeong site is considered to be a base camp. The Jingeuneul site, having a hearth, workshops of various sizes, and over ninety tanged points, may be interpreted as a hunting camp which was seasonally visited by humans to make tools for hunting and processing game. Materials discovered in cultural layers 1 and 4 of Jungnae-ri testify that the site was used for a long period of time, while assemblages from cultural layers 2 and 3 are suggestive of temporary workshop-camps.

Conclusion

Paleolithic studies in the Jeolla Province started twenty years later than in other regions of Korea. However, the Jeolla Province has major importance, even on the East Asian scale. As explained above, sixteen sites have been excavated and seventy-eight surface occurrences of Paleolithic artifacts were reported during the last fifteen years. At the Jungnae-ri site, a complex of cultural layers has been revealed. This has enabled researchers to generate a series of chronological estimations and to understand the process of cultural development. Comparison of materials from Jingeuneul, Wolpyeong, Dosan, and Wondang has shown that these sites were occupied during different periods of time and they represent different patterns of human behavior.

The Paleolithic sites are widely distributed both in upper and lower reaches of rivers, in mountains and low hill areas. The sites can be classified into base camps, hunting camps, and workshops. Furthermore, the given classification can be detailed in terms of long or short periods of human occupation of sites, seasonal activities, and sizes of groups of hunter-gatherers occupying a site.

Analysis of the artifact assemblages has demonstrated that a certain cultural evolution occurred within the Paleolithic: a gradual transition from a flake tool industry to a blade industry and then a micro-blade industry is observed. Two kinds of flaking techniques have been recorded for the Middle Paleolithic: (1) blows struck by a hammer stone held in both hands on a blank clamped between legs, and (2) plain direct percussion. In addition, scaled retouch and Clactonian notch are recorded in the collections. Such techniques were applied to artifacts made of tuff and vein quartz. In the Upper Paleolithic, humans could reach sources of more homogeneous and isotropic raw materials, such as rhyolite, finer vein quartz, and hyaline quartz. New lithic technologies emerged: bipolar knapping, direct percussion with soft a hammer stone, indirect percussion for detaching blades, and pressure technique for micro blade production and edge retouch.

The Middle Paleolithic lithic assemblages, including large flakes in the Jeolla Province, are very similar not only to those discovered at the Jeongok-ri, Geumpa-ri, and Juwol-ri sites in the Gyeonggi Province of Korea, but also to the Dingcun assemblages in China (Pei W.C. et al., 1958; Wang J. et al., 1994). Archaeological investigations have shown that during the late Upper Paleolithic the Jeolla Province constituted a part of the Northeast Asian Paleolithic region, which also included Korea, China (Sagawa, 1999), Japan (Matsufuji, 1998a, b), and Siberia (Kimura, 1997; Lee H.J., 1999), where microblade industries were distributed.

There are several points to be tackled as future research directions. Firstly, more efforts have to be made to discover more Paleolithic cave and open-air sites dated to an earlier period than the Last Interglacial. Secondly, more absolute dates based on diverse dating techniques must be accumulated and the various regional paleoenvironments have to be reconstructed. Thirdly, more systematic and comparative investigations of lithic industries from Korea (including the Jeolla Province) and Northeast Asia are also urgently required.

Acknowledgments

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THE KITOI CULTURE AND ITS PLACE IN THE CLASSIFICATION OF NEOLITHIC CULTURES OF THE CIRCUM-BAIKAL AREA AND CONTIGUOUS REGIONS: CHRONOMETRY AND MIGRATION AREAS*

Introduction

The Neolithic of the Lake Baikal area has already been under study for two centuries. Outstanding Russian scientists, including geologists I.D. Chersky, A.L. Chekanovsky, and I.A. Lopatin, and ethnologist P.A. Rovinsky, among others, have carried out archaeological investigations in order to gain better insight into the prehistory of the area. N.I. Vitkovsky achieved the most important results. In 1880 – 1881 he excavated a prehistoric cemetery located in the Kitoi River estuary, for which this archaeological site is named. The excavations were carried out according to Vitkovsky's methods, focusing on stratigraphy, description of typology and recording the locations of recovered artifacts. Over the course of two seasons of investigations, this burial ground, regarded as a "family cemetery" of prehistoric humans, yielded 23 tombs (Vitkovsky, 1882). Regrettably, many specimens were lost from Vitkovsky's collection of artifacts recovered from the Kitoi cemetery over more than 100 years of storage. However, the remaining grave goods, as well as the noted specificity of the Kitoi burial practice, have served as a basis for the cultural identification of newly discovered sites yielding similar categories of implements (in the case of burial sites, traces of specific burial practices were considered diagnostic).

In 1957, investigations at the Kitoi cemetery were resumed by A.P. Okladnikov, leading the Bratsk archaeological expedition of Irkutsk State University. A member of this expedition, G.A. Maksimenkov, established an excavation area (30 × 10 m) located 4 km from the Kitoi River estuary on the bank of the Angara River near the village of Yarki. The excavation area yielded six tombs. On a small terrace 50 m from the Angara bank, P.P. Khoroshikh established another excavation area, which included two tombs (Okladnikov, 1974: 57 – 61). In total, 32 tombs were excavated at this site. The burial ritual features noted in different tombs were not uniform. The tombs may be classified into the following types by the positioning of the human skeletal remains: (1) individual burials of adults, with supine positioning of the skeleton (n=20); (2) same as the previous type, but the skeleton was laid face down (n=2); (3) individual burials of adults, skeleton flexed (n=2); (4) paired burials (n=2); (5) burials with dismembered skeletons (n=4); (6) infant burials (n=3); and (7) burials in which the body was placed in a sitting position facing southeast (excavations by Khoroshikh). The majority of the burials were oriented towards the northeast (n=24), while six skeletons were oriented towards the southwest. One paired burial revealed an opposing orientation of the skeletons – to the northeast and southwest. Skeletons of another paired burial showed the orientation of both skeletons to the northeast (tomb 19, excavations by Vitkovsky). All the tombs revealed traces of ocher.

A detailed description of grave goods recovered from the Kitoi cemetery is given in N.I. Vitkovsky's *Reports* (1880, 1882) and in a monograph by G.M. Georgievskaya (1989). Okladnikov (1950: 51 – 97), comparing specific features of the burial practice of the Kitoi cemetery to other Neolithic sites of the Circum-Baikal area, pointed out that the Kitoi tool kit differs from those identified for

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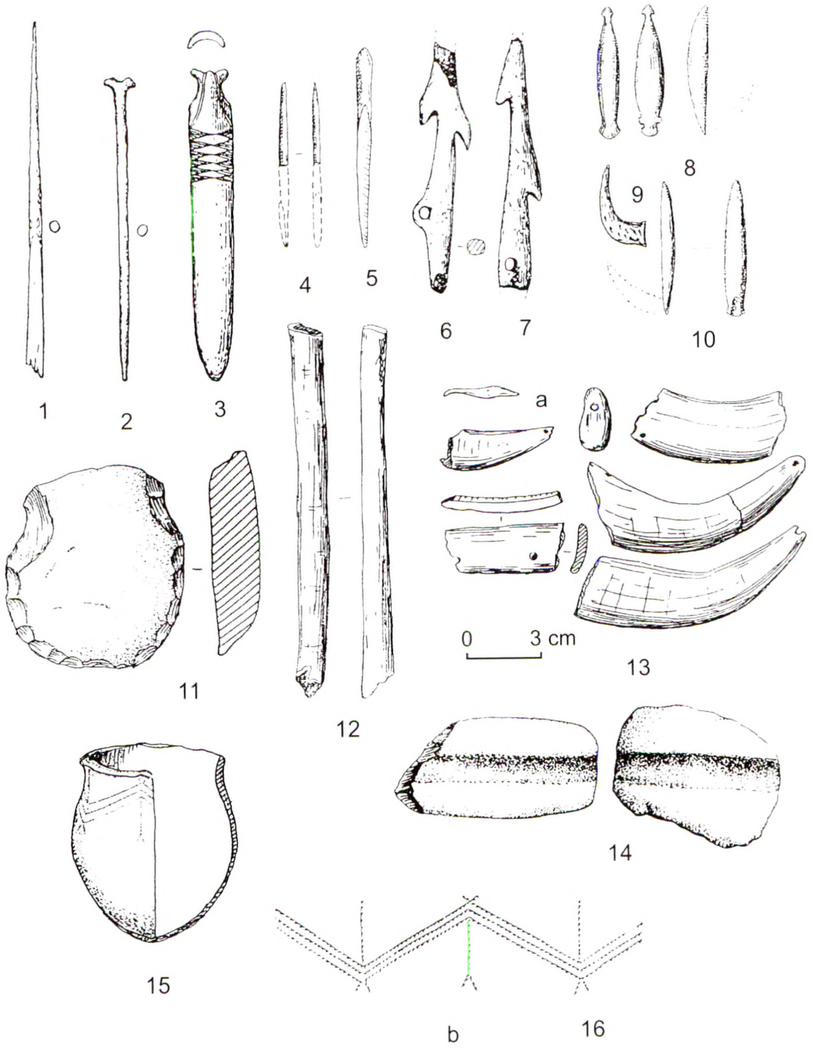

Fig. 1. Typical artifacts of the Kitoi Culture.
1 – 7, 12 – bone implements; *8 – 11, 14* – stone implements; *13* – adornments made of bone and animal teeth (*a* – elk head figurine); *15* – ceramics (*b* – a decorative motif).
1 – 14 – materials from the Kitoi cemetery; *15* – materials from Ulan-Khada.

the Isakovo and Serovo Cultures in that the former contains numerous bone implements. The typical Kitoi collection of bone implements includes such categories as: pointed spear and javelin heads; pointed arrowheads with flat stems (Fig. 1, *1, 2*); implements reminiscent of daggers with patterned hilts (Fig. 1, *3*); needle-cases made of tubular bird bones (Fig. 1, *12*); harpoons with holes for attaching a rope, representing the most characteristic feature of the Kitoi harpoons (Fig. 1, *6, 7*). Also, spades made of elk scapula were recovered. Specific stone tools, such as arrow straighteners made of abrasive rock, were also noted (Fig. 1, *14*). The Kitoi burials revealed large discoid side-scrapers made on flat pebble spalls, with one of their faces retaining natural crust (Fig. 1, *11*). Similar side-scrapers have been recorded from the Isakovo burials. Small stone spikes for composite fishing hooks constitute the most numerous category of the Kitoi grave goods. These implements consist of conic-shaped shanks with rounded tips. (Fig. 1, *8*) Rodent canines and claws, as well as bone spikes intentionally shaped as claws (Fig. 1, *9, 10*), served as in-laid parts for the composite implements identified as the Kitoi fishing hooks.

The Kitoi adornment kit includes numerous implements made of Siberian deer teeth and split wild boar tusks (Fig. 1, *13*). Small figurines of elk heads, realistically and skillfully manufactured, represent another type of adornment or, probably, amulets (Vitkovsky, 1880: plate 4). Upon the discovery of the Kitoi cemetery, the Kitoi Culture burial sites yielding a lithic industry of prismatic blades and corresponding cores had also been recorded at the Cyclodrom and Locomotive prehistoric cemeteries (environs of Glazkovo), as well as a burial site at the Belaya River estuary (Georgievskaya, 1989). Elk head figurines were also recovered from the latter site (Fig. 2, *1*). The collection of bone articles includes other skillfully made pieces: a spoon-scoop with patterned haft; an arch-shaped spike, rounded in cross-section and bearing an anthropomorphic image on its hilt, and other implements bearing carved geometric patterns (Fig. 2, *2 – 5*).

Many Neolithic and Eneolithic sites have been reported from places other than the Cis-Baikal area yielding the artifacts similar to the Kitoi categories. Such sites were investigated on the upper Lena River, in Yakutia, and in the Trans-Baikal region, including Buryatia and the Chita Province, as well as from the northern parts of Mongolia. Such sites have been also reported from the northern foothills of the Altai, which are situated to the west of Lake Baikal. The Altai materials will be discussed in this paper. In order to understand the role of the Kitoi Culture in the evolution of the Neolithic and Eneolithic in the Circum-Baikal area and in East and West Siberia, a considerable array of facts and materials accumulated during the whole period of investigations should be analyzed both from the point of view of typology and possible correlations. This paper presents an attempt to classify the materials available from the sites attributed to the Kitoi Culture investigated by the author and other researchers. Available radiocarbon dates have proven crucial in establishing reliable correlations.

Kitoi grave goods and burial practices as indicators of the Kitoi population's participation in the formation of Neolithic cultures in the western Baikal area

The collections assembled at Neolithic sites and tombs reveal a considerable amount of similar features of stone and bone implements attributable to various cultures of the relevant period. On the other hand, particular cultures demonstrate specific characteristic features. Most characteristic of the Kitoi Culture is the occurrence of ocher in the tombs. Some burial sites revealed only solitary spots of ocher, while others yielded whole skeletons or their separate parts colored with ocher. In some tombs, the entire floor of the tomb was strewn with ocher. It is commonly believed that personal belongings of a buried individual were put into his/her grave, though this point has not been unanimously agreed upon yet. If Neolithic tombs and settlements located in the same region produce characteristically similar goods, it is suggestive of an identical cultural attribution of these sites. Archaeological materials recovered from Neolithic sites at Sagan-Zaba and Elgen bays on the western bank of Lake Baikal opposite Olkhon Island, and the Shamansky Mys site on Olkhon, may serve as such examples.

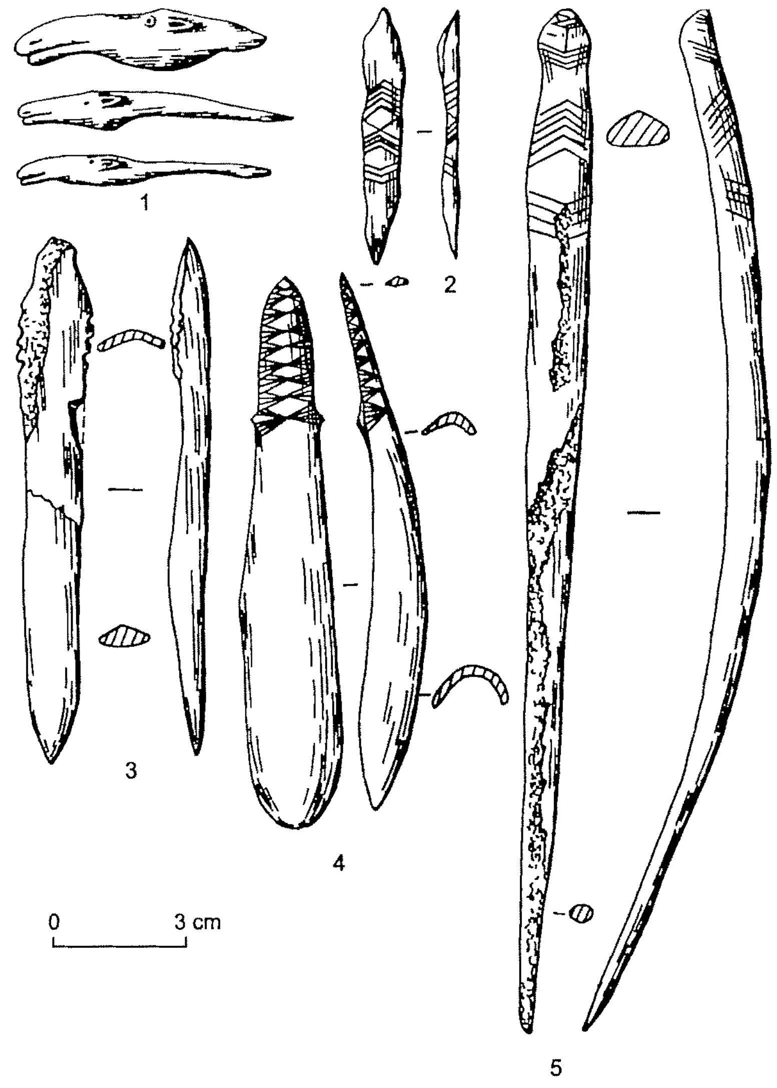

Fig 2 Art objects from the Ust-Belaya cemetery (after (Georgievskaya, 1989)). *1* – elk head figurines, *2 – 5* – implements bearing decorative motifs

Analyses of artifacts recovered from a stratified site in Sagan-Zaba Bay on the western bank of Lake Baikal attest to the Kitoi affinities of the collection. Stratum 5 (2.7 m below the current surface) of this site revealed the following artifacts: a piece of horn exhibiting traces of sawing, a discoid side-scraper made of siliceous rock, 6.5 cm in diameter (discoid side-scrapers are commonly reported from the Kitoi Culture sites (Georgievskaya, 1989: fig. LXIV, 3)); a bone holder of a composite knife; a few black pebble flakes; and a hand axe. It is noteworthy that no ceramic ware was noted at the site. A radiocarbon date of 8775 ± 40 yrs BP (SOAN-1574) was generated on bone for this stratum.

The overlying culture-bearing horizon 4 yielded a greater collection of artifacts. The collection is comprised of 20 flint knife-blades from 2 to 7 cm long. Some specimens of this category exhibit fine retouching of their narrow ends or lateral sides. Ceramics and a polished sharp-ended bone spike of a Kitoi composite fishing hook are the most important artifacts of the recovered collection. A radiocarbon date of 7630 ± 45 yrs BP (SOAN-1573) is available for this stratum. Prismatic and triangular in cross-section knife-blades were found in association with this stratum. The presence of these artifacts allows the correlation of this stratum to culture-bearing stratum 11 (classification by B.E. Petri) of the stratified site of Ulan-Khada. The stratum 4 collection also revealed end-scrapers and burins with lateral working edges. One of the blades exhibits a serrated lateral edge.

The typology noted within the Sagan-Zaba stratum 4 collection suggests its correlation to certain Mesolithic sites of the Olkhon area and the western bank of the Angara River, in particular the collection of artifacts associated with the lower strata of the Tsar-Devitsa site (Georgievsky, Medvedev, 1980: 105 – 107). The blade-based industry of Sagan-Zaba stratum 4 finds its analogues with the collections recovered from Berlogi and Sagan-Nuge, culture-bearing horizons VII and VI, dated to 6.5 – 7 ka ago (Khlobystin, 1976: 25 – 32; 1965: 252 – 279).

The third cultural horizon yielded ceramic fragments showing various decorative designs: slanting parallel incisions stamped with the aid of a spatula, comb imprints, a band of beads parallel to the vessel rim, cord impressions combined with a geometrical motif in the form of a tridactylous bird's claw directed from the rim downwards. Ceramic materials with ornamentation in the form of dotted lines, slanting parallel incisions and cord impressions were reported from Late Serovo burial sites dated by Okladnikov (1950: 411) to no later than the 3rd millennium BC. Such an attribution is supported by later investigations (Goriunova, 1987: 64 – 66). Stratum 3 of the Sagan-Zaba site yielded a radiocarbon date of 6000 ± 40 yrs BP (SOAN-1572) on charcoal (Konopatsky, 1982: plate 1). This stratum produced ceramic materials and bone implements including pressure tools, points, horn fragments with sawing signs, bone parts of composite knives, and two harpoons. Also, stone tools were recovered including retouched knife-blades, hammer stones, and two jade axes, one of which was identified as an axe with protruding parts commonly designated as "ears." Such eared axes are usually reported from the Kitoi burial sites and constitute the typical set of this culture These tools might have been used as adzes as one of the faces of such tools is usually flat and the opposite convex. A similar well-polished tool was recorded from paired burial 5 (excavations of 1978) of the Kitoi Culture cemetery located in the Khotoruk fold (Aseyev, Konopatsky, Grichan, 1980: 25 – 31). Also two human skulls were uncovered at this cemetery in association with typical Kitoi adornments: teeth of Siberian deer and blades made of split boar tusks showing drilled holes, suggesting their having been sewn onto headgear.

The burial practice recorded at this cemetery is noteworthy. The cemetery reveals six stone surface constructions. All the tombs exhibit a rounded form with central depressions. The grave pits are oriented along a north-south line with insignificant deviations. Three single and two paired burials yielded flexed skeletons. Both skeletons were laid with their heads to the north in one of the paired burials, while the other showed the skeletons with their heads oriented in opposite directions: one to the north, the other to the south (both skeletons were laid on their right sides). The latter skeleton occupied the southern third of the burial chamber. The above-mentioned "eared" axe was found in association with this skeleton. Certain features allow us to identify this burial as a secondary burial, or as an interment of a second individual. Burial 3 revealed three skeletons.

Two flexed skeletons were laid on their right sides, with their heads oriented in opposite directions – one to the north and one to the south. Similar to the above example, the southern skeleton occupied one third of the burial chamber. The anatomical order of bones was notably disturbed, which supports our assumption that it was a secondary burial in the same grave pit, or a burial of a second body in the same chamber. The bones of the third skeleton were found in disorder, overlying the leg bones of the other two skeletons. The skull of the third individual was overlaid by its femur and shin bones, suggesting an interment of this flexed skeleton in a sitting position.

In all the tombs of the Khotoruk cemetery, ocher coloration of the skulls and ocher accumulations beneath the skulls were noted. The cemetery was dated to the 6th millennium BC by the radiocarbon method (Mamonova, Sulerzhitsky, 1989). This date is well correlated to the age estimations of Sagan-Zaba stratum 3, which yielded the "eared" axe. The sites are located at a distance of 12 – 13 km from each other, suggesting possible direct connections between populations of these two sites.

A Neolithic site was located at Elgen Bay, 35 km north of Sagan-Zaba. The excavated area totals 34 sq. m. The site yielded 32 "eared" axes including complete and fragmented specimens; only one of these specimens was polished. The rest of the tools were fashioned with the help of wide flake removals and secondary treatment and resembled tool blanks rather than finished working tools. However, all the specimens exhibit signs of use-wear on their cutting edges attesting to their utilization. The use-wear analysis shows that these implements were used for making ice-holes (Volkov, 1986). This fact, and the occurrence of harpoon fragments, suggest winter fishing and ichthyofauna hunting practices.

Complete harpoons and blanks for their production were also reported from burial 2 (1975) of the Shamansky Bay cemetery on Olkhon Island (Konopatsky, 1982: plate XXXIX).

Arrowheads are not so numerous as fishing items at the sites and burials of the Kitoi Culture. This fact allows us to hypothesize that at a certain period of time, probably during the advanced Neolithic, the Kitoi population inhabiting the banks of rivers and lakes adopted an economic system based on fishing rather than hunting. Obviously, both trades were practiced. For instance, the Kitoi population of Lake Baikal hunted seal. This is suggested by abundant bones of these animals recovered from Neolithic layers 2 and 3 at Sagan-Zaba, as well as from Neolithic layers at the Elgen and Shamansky Bay sites (Olkhon Island). The seal bones were identified as belonging to young animals, which were hunted early in spring (Ovodov, Panychev, 1982). The seasonal seal hunting could not provide food supply throughout the year. Moreover, seal bones, like fish bones, with rare exceptions, are not suitable for tool and weapon production. Hunting aquatic animals does not provide enough raw materials for clothes production, dwelling manufacturing, etc. Forest animal hunting filled the deficiency. Abundant forest animal bones (bear, wild boar, Siberian deer, roe deer, wolf, etc.) recovered from the sites discussed here support this supposition.

Tomb 3 (1972) of the Shamansky cemetery yielded stone and bone grave goods. The set of stone tools includes knives, scrapers, knife blades, arrowheads, and abrasive stones. The bone tools collection comprises deer antler spikes with sharp tips, bone parts of composite knives, harpoons, one spoon, one blade made of split wild boar tusk, and a fishing line reel. Also, a set of 17 small stone spikes and 10 small points made of rodent's claws, teeth and bones represent in-laid parts for composite fishing hooks of the Kitoi type. The available evidence allows us to infer that both hunting and fishing played important roles in the Kitoi economy. Most probably there were seasonal preferences for a particular occupation.

The skeleton and the floor of the Shamansky tomb 3 burial chamber were strewn with red ocher. Two radiocarbon dates bracketing a considerably long time period are available for this burial: 5720 ± 50 yrs BP (Le-1076) and 6550 ± 35 yrs BP (SOAN-790). A mean age of ca 6000 years was proposed for this burial, which correlates well with the Khotoruk burials of the Kitoi Culture.

Noteworthy is the interment of two dogs located in the Shamansky Bay. The burial contained a human skeleton and two extended dog skeletons placed on either side of the human remains. This case of intentional interment of dogs is not unique for Neolithic and earlier burial sites. Ritual interments of dogs were reported from several sites in the Baikal area: the Ust-Belaya Mesolithic settlement (Medvedev et al., 1971) in the Cis-Baikal; the Nizhnaia Berezovka settlement in the western Trans-Baikal (Okladnikov, 1952; Tsalkin, 1970), and at the Posolskaya site*. The earliest dog burial recorded in Siberia was uncovered in a Paleolithic dwelling at the Ushki site in the Kolyma region (Dikov, 1979). These data provide evidence that dog "taming" was practiced in Siberia as early as the Upper Paleolithic, suggesting an early development of the human economic activity of animal domestication. The bearers of the Kitoi archaeological culture evidently participated in this process along with other populations of Siberia.

Position of the Kitoi Culture in the cultural-chronometric classification of the Cis-Baikal Neolithic cultures

Okladnikov elaborated on a provisional chronometric classification of the Cis-Baikal archaeological cultures in the 1930s. He wrote:

> Apparently, additional facts that may occur in the future will allow researchers to make necessary changes in the current comprehension of prehistoric processes. These possible changes may lead to considerable corrections in currently adopted classifications. Real life is incomparably richer than any scheme. Any new reliable information is welcome; it represents a step in the critical perception of the established sequences of cultures and periods towards a more accurate definition and enrichment of the current understanding of historic processes (Okladnikov, 1974: 18).

Okladnikov (1955: 139) proposed the following chronometric sequence:

Late Paleolithic (Mesolithic): 8th – 6th millennium BC
Early Neolithic – Khin period: 5th millennium BC
Isakovo Period: 4th millennium BC
Serovo Period: 3rd millennium BC
Kitoi Period: second half of the 3rd – beginning of the 2nd millennium BC
Glazkovo Period: 1700 – 1300 yrs BC
Shiversky Period: 1300 – 900 yrs BC.

This classification inspired an on-going debate concerning the evolution of the Kitoi Culture and its place within the sequence of local archaeological cultures. M.M. Gerasimov disagreed with Okladnikov on the relative position of the Kitoi Period. Gerasimov argued that the Kitoi Period did not fit the Cis-Baikal trajectory of material culture development. The Kitoi Culture does not represent the continuous development of the earlier cultures, nor does it evolve into the succeeding periods. Such an intrusion of foreign culture may be explained only by an invasion of some new population, which was hardly the case. Gerasimov proposed that the Kitoi Culture was practiced during the intermediate time between the Khin and Isakovo periods. He also believed that the Isakovo and Serovo periods shared so many features that it seemed reasonable to combine them into one (Gerasimov, 1950: 415 – 450). Thus, Gerasimov's chronological scheme is as follows: Khin, Kitoi, Serovo, and Glazkovo periods.

Gerasimov and Chernykh (1975) expressed their point of view on the antiquity and specificity of the Kitoi Culture in their report on excavations of the Fofanovsky cemetery. They considered the Kitoi Culture as a peculiar phenomenon exhibiting no genetic connections with the succeeding cultures of the Glazkovo and Shiversky periods in Okladnikov's classification.

In 1976 Khlobystin revised Okladnikov's classification. He included some Upper Paleolithic sites yielding bifacially worked tools into this classification. According to his classification, the Ludarsky period bracketed a range from the 12th – 7th millennium BC; the Ulan-Khada period encompassed the 7th – 6th centuries AD. The Kitoi period was placed between the Serovo and Isakovo periods, the latter succeeding the Serovo in Khlobystin's classification, in contrast to

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* Svinin V.V., A report on archaeological investigations in the Baikal territory, 1963 – 1964 The Archive of the Institute of Archaeology of the Academy of Sciences of the USSR. P-1. N 2868 P. 12.

Okladnikov's. Khlobystin also believed that the Kitoi Culture originated in Trans-Baikal (Khlobystin, 1964: 14).

A.K. Konopatsky worked out a chronometrically based classification of the cultures that were identified in the steppe area on the western bank of Lake Baikal near Olkhon Island. This classification adds to the classification of Cis-Baikal Neolithic cultures, as it provides a chronometrically based sequence of identified cultures. A series of ^{14}C dates bracketing a considerably wide chronometric range for the Kitoi burials and supporting their antiquity was generated: 6550 ± 35 yrs BP (SOAN-790); 5720 ± 50 yrs BP (Le-1076); 4380 ± 15 yrs BP (SOAN-1665) (Konopatsky, 1982: 71). N.N. Mamonova and L.D. Sulerzhitsky also attempted to establish their own classification of Cis-Baikal Neolithic cultures by age. They employed the method of demineralization of bone in hydrochloric acid solution. Benzol extracted from 120 bone samples recovered from various burial sites in the Cis-Baikal area was subjected to radiocarbon analysis. The following classification of Cis-Baikal Neolithic and Eneolithic cultures was proposed by these authors:

Glazkovo Culture: end of the 4th – end of the 3rd millennium BC

Serovo Culture: 4th millennium BC

Isakovo Culture: end of the 5th – beginning of the 6th millennium BC

Kitoi Culture: 6th millennium BC (Mamonova, Sulerzhitsky, 1989: 31).

G.M. Georgievskaya provided results of a typological study of the Kitoi archaeological materials obtained from the Kitoi cemeteries and multilayered settlements yielding sequences of occupation horizons that were attributed to different cultures. She inferred:

> The Kitoi Culture should be considered an indigenous culture... Specificity of the Kitoi Culture may be explained by the fact that the Kitoi population inhabited such territories where they could practice both hunting and fishing. This specific tool kit resulted from their way of life. The Kitoi period lasted for about 2.5 thousand years. It brackets the time range from the 5th to the second part of the 3rd millennium BC (Georgievskaya, 1989: 135).

The available information referred to above shows a contemporaneous existence of the Kitoi, Isakovo, Serovo, and Glazkovo Cultures during a certain chronometric period in the Cis-Baikal region (see Table). This fact certainly contradicts the customary idea of successive and continuous development of the Neolithic This idea was stressed by Okladnikov, as mentioned above.

The lower chronometric boundary of the Kitoi Culture's existence has been established at around the 7th millennium BC, while the upper boundary is the beginning of the 2nd millennium BC. These age estimates are close to the ones proposed by Okladnikov. According to Okladnikov's classification, the Khin, Isakovo and Serovo, and the Kitoi period itself, occurred within these five millennia. It seems reasonable to change the term "period" into "culture," because the term "period" has a connotation of succession. The Kitoi Culture is original and indigenous at the initial stage of its development, just as the Isakovo and Glazkovo Cultures. The graph shows a correlation of certain chronometric schemes of evolution of the Cis-Baikal cultures during the Neolithic and Eneolithic (Table).

A new chronometric classification of the Cis-Baikal Neolithic and Bronze Age cultures has been established on the basis of recently obtained data and dates:

Late Paleolithic (Mesolithic) Culture: 8th millennium BC

Early Neolithic Culture: first half of the 7th millennium BC

Kitoi Culture: second half of the 7th millennium BC – beginning of the 2nd millennium BC

Isakovo Culture: beginning of the 6th millennium BC – first half of the 5th millennium BC

Serovo Culture: second half of the 5th millennium BC – first half of the 3rd millennium BC

Glazkovo Culture: end of the 4th millennium BC – second half of the 2nd millennium BC

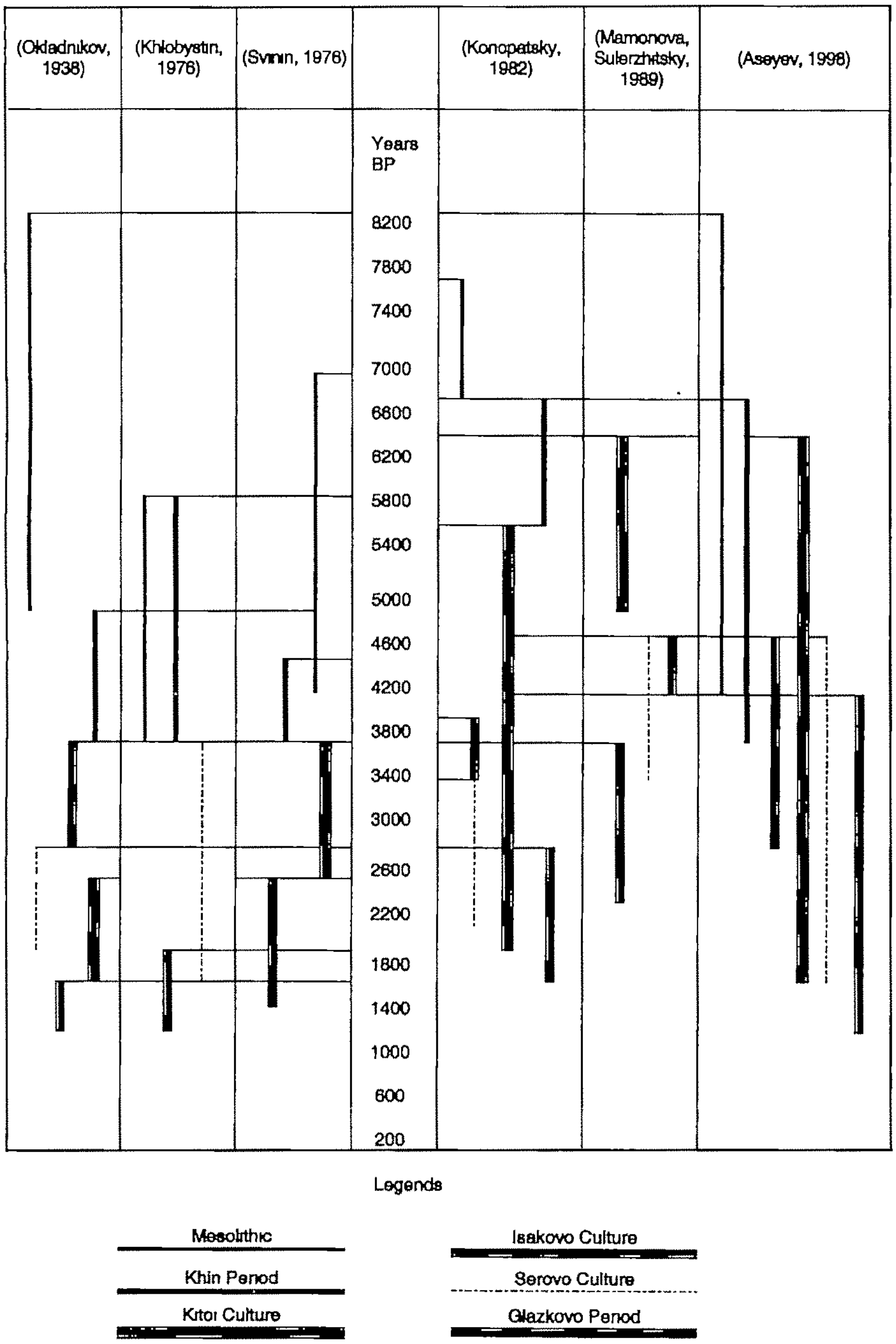
Shiversky Culture: first half of the 2nd millennium BC – end of the 1st millennium BC.

This classification should not be regarded as a final version. It shows the period of possible co-existence, links, and continuity of the local variants of the Neolithic and successive cultures in Cis-Baikal.

Possible origin of the Kitoi Culture. Migration areas of the Kitoi population

The origin of the Kitoi Culture is a challenging problem We have already cited the hypothesis of Khlobystin, who argued that this culture was inserted into the Cis-Baikal by the Daurian tribes from the Trans-Baikal. The analysis of the burial practice noted in Neolithic burials in the Trans-Baikal revealed a series of sites attributable to the Kitoi Culture. One such burial, in which the burial chamber was powdered with ocher, was investigated by Okladnikov in the territory of the Krasnyi Chikoi farm on the left bank of the Chikoi River. E.A. Khamsina excavated a solitary burial site at Lysaya Gora in Ulan-Ude. The Lysaya Gora grave goods share many features with the Kitoi burials in the Cis-Baikal. L.G. Ivashina investigated the Bukhusan cemetery in the Lake Eravnoe locality. Three burials of adults whose skeletons were laid in a flexed position on their right side, with the heads oriented to the northeast, also revealed ocher powder. The noted stratigraphic features, burial rite traces, and characteristic grave goods recovered (small spikes of Kitoi composite fishing hooks together with adornment items of Siberian deer

Comparison of chronological schemes of the Cis-Baikal archaeological cultures' development suggested by various researchers



teeth and wild boar tusks) allowed her to attribute the sites to the Kitoi Culture (Ivashina, 1979).

The Fofanovski cemetery located in the lower reaches of the Selenge River yielded about 100 burials. The whole series was subdivided into two sub-series according to the different stratigraphic features. The earlier series is comprised of burials associated with the lower level of buried soil. The burials included in this series demonstrate the following characteristic features of the burial rite: positioning of the dead body on its side or on its back with flexed legs, powdering dead bodies with red ocher, the orientation of the head to the southeast. Also some new features were noted. In particular, certain tombs of this cemetery revealed one full skeleton and separate skeletal parts of another individual. For instance, one tomb yielded six human skeletons without skulls*. The grave goods recovered from such tombs include mostly composite knives and daggers, knives fashioned on blades with the aid of retouching of both faces, arrowheads, adornments made of shells, wild boar tusks, and Siberian deer teeth. No ceramics were noted. Such burials probably belong to the Kitoi Culture of the advanced Neolithic period.

Burials revealing analogous burial rites were investigated in Mongolia: a site located in the vicinity of the city of Choybalsan, a Neolithic settlement in the Tamtsag-Bulag *somon* (district) (Okladnikov, Larichev, 1969); and a burial site located 6 km from the Dzun-Uldzit station. Both sites date to the 3rd millennium BC (Okladnikov, Derevianko, 1970, Dorj, 1971). Most burials revealed skeletons in sitting positions; two of them were powdered with red ocher.

Burial sites with ocher were located on the Nikolsky spring estuary in the Upper Lena Basin, along the Kachug – Zhigalovo motorway. The burials were made in rock recesses. Dead bodies were placed one above the other, their heads oriented in opposite directions. Burial 1 revealed three skeletons, and two skeletons were recovered from burial 2. The sets of grave goods recovered from these burials include various bone points, bone parts of composite knives, bone arrowheads with concave bases, ceramics decorated with cord imprints, and birch bark pieces. Adornments made of full wild boar tusks were also recovered. A ^{14}C date of 4940 ± 70 yrs BP (GIN-4371) was generated for these burial sites, allowing its attribution to the advanced Neolithic period (Bazaliyski, Menshagin, Lykhin, 1996).

In 1966, an even earlier Neolithic burial was investigated by researchers from Irkutsk. The site was located on the right bank of the Lena River in its upper reaches, in the vicinity of the Novye Kazarki station in the Ust-Kut region. The site revealed a paired burial partially destroyed by the erosion of the riverbank. The skeletons were laid in supine position with their legs slightly flexed at the knees. The heads were oriented to the south, or upstream. The burial yielded the following grave goods: the bone part of a composite single blade knife; a polished bone point; a needle case made of a tubular bone; a flat bone spoon; a bone spike fragment, one end of which demonstrates a typical Kitoi terminal, the opposing end missing; a fragmented bait figured as a fish made of white shale; an abrasive of fine-grained sandstone; fragments of a small carnivore mandible, and others. The lower surfaces revealed traces of ocher. A ^{14}C date of 7120 yrs BP was generated on bone. Researchers attributed this site to the Kitoi Culture (Bazaliyski, Zadonin, 1996).

Neolithic burials with ocher were also reported from Yakutia, a region neighboring Cis-Baikal. These sites, dating to the 3rd millennium BC, were located in the vicinity of Olekminsk and at Tuoi-Khaya cemetery (Fedoseyeva, 1968).

Neolithic cemeteries 1 and 2 were discovered in the vicinity of Lake Nozhiy in the eastern Trans-Baikal and attributed to the early stage of the Kitoi Culture. The noted features of the funerary rite allow such an attribution: positioning of the dead (flexed, on the right side), eastward orientation of the skeletons, traces of ocher within the burial chamber, adornments of shells, Siberian deer teeth, and wild boar tusks; composite knives, arrowheads with straight bases, and numerous Daurian points fashioned on knife-like blades. One Khin arrowhead was also recovered (Okladnikov, Kirillov, 1980). Okladnikov dated the Khin period to the Early Neolithic. Noteworthy is the fact that the Daurian points and the Khin arrowhead were associated with the human skeleton buried in a sitting position, a typical feature of the Kitoi funeral rite. The sites referred to in the present article support our hypothesis on the links existing between the Neolithic populations of the Cis-Baikal and Trans-Baikal regions. On the other hand, the Cis-Baikal monuments yielded richer and more diverse collections of tools in comparison with the Trans-Baikal sites. About 20 sites attributable to the Kitoi Culture have been located so far in the area of the upper reaches of the Angara River, the western bank of Lake Baikal including Olkhon Island, and the upper reaches of the Lena River. This series of sites includes not only burial sites but also settlements, such as Sagan-Zaba and Elgen. The age estimates of the Kitoi period include the following dates obtained from various sites: for instance, the earliest date of culture-bearing horizon 4 of the multilayered site of Sagan-Zaba is 5660 yrs BC; the Kitoi burial site 3 (excavations of the year 1972) on the Olkhon Island yielded a date of 4580 yrs BC (Konopatsky, 1982: 71); the age of the Khotoruk cemetery brackets the 6th millennium BC (Mamonova, Sulerzhitsky, 1989). Thus we may hypothesize that the Kitoi Culture originated in the Cis-Baikal, namely in the Olkhon area, during the Mesolithic or Early Neolithic on the basis of some earlier culture, the economy of which depended on fishing. For instance, the Verkholenskaya Gora Mesolithic site yielded a harpoon (Aksenov, 1980: 55) that may be considered as one of the proofs of our hypothesis.

Interesting results of Neolithic burial investigations are reported from the northern piedmonts of the Altai (Kiriushin, Kungurova, Kadikov, 2000). The Neolithic cemetery of Ust-Isha was located on the bank of the Isha River, 3 km downstream from its confluence with the Katun. Eleven tombs of the total 14 burials were referred to as true Neolithic ones. This original site produced archaeological materials showing analogous features with

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* Griaznov M P., A report of the Irkutsk archaeological expedition on the excavations in the Baikal area in 1959 The Archive of the Institute of Archaeology of the Academy of Sciences of the USSR. P-1. N 2023 P 6.

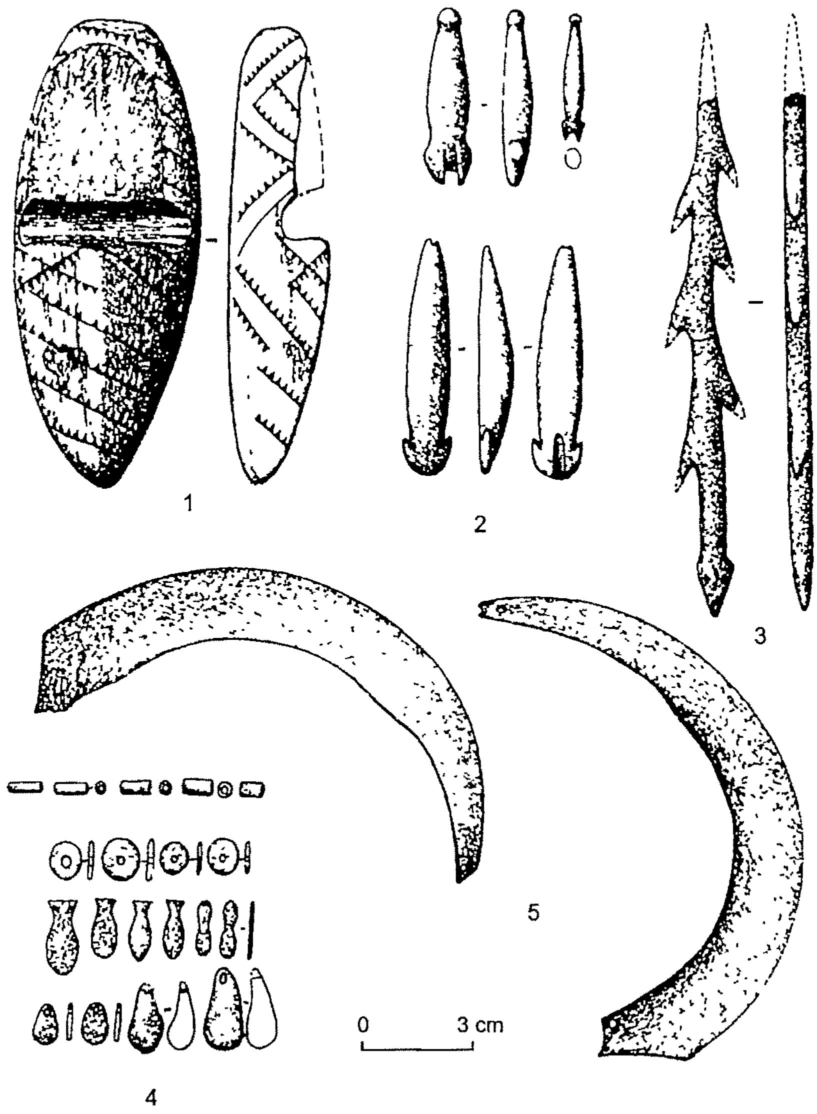

Fig 3 Artifacts from the Ust-Isha cemetery (after (Kiriushin, Kungurova, Kadikov, 2000)).
1, 2 – lithic artifacts; *3 – 5* – bone artifacts

those reported from Kitoi and Serovo cemeteries in Cis-Baikal. Each of these sub-series of the Ust-Isha tombs produced different tool kits and evidence of funeral rites. Most of the Ust-Isha tombs, though, yielded grave goods typologically similar to the Serovo Culture's grave goods in the Cis-Baikal, including large bifacially worked stone daggers, points with bifacial retouch, arrowheads with concave bases, and bone parts of double composite knives with a hole at the end of the hilt. The features of the funeral rite were established as follows: orientation of the skeletons to the northeast; no traces of ocher powdering over the body or burial chamber (Ibid.: 9 – 29, 51 – 60). However, the researchers of Ust-Isha declared that the recovered materials bore both Serovo and Kitoi cultural features. For instance, tomb 9 at Ust-Isha yielded a harpoon, whose armature piece is similar in shape to the Kitoi specimens (Georgievskaya, 1989: 73 – 74). The shape of the stalk is also similar to the Kitoi examples, but unlike the latter, there is no hole for attaching a rope (Fig. 3, *3*). The characteristic features of harpoon fastening reveal analogues closer to the Serovo and Glazkovo harpoons. Thus, this type of harpoon demonstrates a combination of cultural characteristics. The Ust-Isha tool kit also contains stone spikes for fishing hooks resembling the Kitoi type of the relevant implements (Fig. 3, *2*). A large amount of fishing hooks resembling the Kitoi type was reported from burial 1 in the Nizhniy Tytkesken Cave dated by the radiocarbon method to 3950 – 3260 yrs BC (Kiriushin, Kungurova, Kadikov, 2000: 52, fig. 26, *3*; 25, *25*, *26*). An adornment set, including pendants of Siberian deer teeth and wild boar tusks and beads made

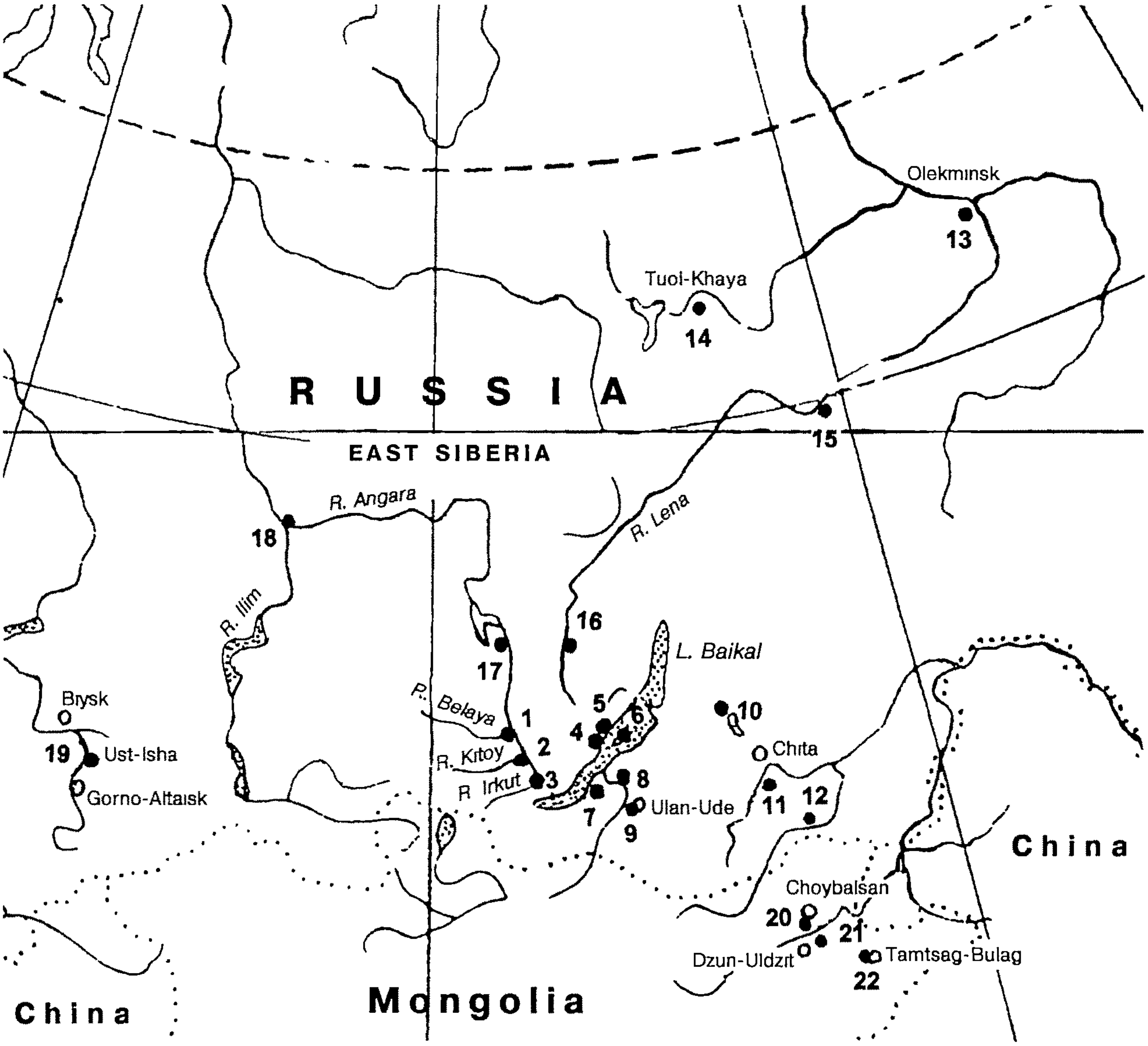

Fig. 4. Map showing the distribution of Kitoi sites in Cis-Baikal and contiguous regions.
1 – the Belaya River estuary, *2* – the Kitoi River estuary; *3* – the Irkut River estuary, *4* –Sagan-Zaba Bay, *5* – Elgen Bay; *6* – Shamanski Mys (Olkhon Island), *7* – Posolsk, *8* – Fofanovo, *9* – Lysaya Gora (Ulan-Ude); *10* – Lake Eravnoe; *11* – Krasnyi Chikoi farm, *12* – Lake Nozhiy; *13* – Olekminsk, *14* – Tuoi-Khaya; *15* – Novye Kazarki village, *16* – Nikolski Creek; *17* – Rasputino village, *18* – the Ilim River estuary; *19* – the Isha River estuary, *20* – Choybalsan (Mongolia); *21* – Dzun-Uldzit (Mongolia), *22* – Tamtsag-Bulag (Mongolia)

of river shells, also attest to Kitoi affinities (Fig. 3, *4*, *5*). Noteworthy is the ornamentation motif on the presumable arrow straightener recovered from tomb 9 at Ust-Isha, which is very close to the motif on ceramics from the Ulan-Hada site in the Olkhon region in the Cis-Baikal (see Fig. 1, *15*, *a*). This site was attributed to the Neolithic Kitoi period. The function of such implements has not been determined yet. However, a deep rounded groove allows us to hypothesize that the function of this implement is the same as that of other similar tools recorded at sites of the Kitoi and Serovo Cultures in the Cis-Baikal. All such implements were made of abrasive rocks and were apparently used as straighteners for arrows and other stems and similar wooden and bone items, or as planes (see Fig. 1, *14*).

Analyses of resemblances and distinctions in the major characteristic features allow researchers to establish a cultural-chronometric affinity between the Ust-Isha archaeological materials and the artifacts of the Serovo Period from the Cis-Baikal. The noted facts attest to an affiliation of the Katun population to the dissemination area of the Cis-Baikal Neolithic cultures. Occurrences of artifacts closely resembling the Kitoi types supports the Ust-Isha age estimates in the range of middle to the second part of the 4th millennium BC (Ibid.: 54). On the other hand, such age estimates have proved our hypothesis on the co-existence and mutual relationships between the Kitoi, Isakovo, and Serovo Cultures. It also adds to our understanding of the migration routes of the Cis-Baikal population during the Neolithic.

The Kitoi Culture was dispersed over a large area (Fig. 4). It includes the northeastern provinces of Mongolia, southern regions of the Trans-Baikal, the southeastern bank of Lake Baikal itself, the Olkhon area of the Baikal coast, the lower and middle reaches of the Angara River, the upper Lena Basin reaching Olekminsk city and the Vitim River, and northern piedmonts of the Altai. We may hypothesize that during the advanced Neolithic period, human populations bearing the Kitoi Culture or experiencing the impact of the Kitoi Culture in their material culture and economy moved from the Cis-Baikal to the north, west, and east.

Conclusion

In summary, the established chronometric sequences of the existence periods of various Cis-Baikal archaeological cultures, as well as available radiocarbon dates generated in different laboratories, demonstrate continuity in the cultural evolution and co-existence of certain cultures during particular historical periods.

1. New chronometric ranges have been established for the Kitoi Culture bracketing the period from the 6th to the 2nd millennium BC. The concentration of Kitoi sites in the Olkhon area, especially those dating from the 6th millennium BC, supports the hypothesis that this archaeological culture originated exactly at this place.

Isakovo and Serovo Cultures were also practiced within the Kitoi period, or existed during the same time as the Kitoi Culture, in the advanced Neolithic. The economy of the former cultures was practically the same and evolved in continuity with the Kitoi Culture, but was mostly based on hunting.

2. During the advanced Neolithic, probably at the beginning of the 4th millennium BC, both the Kitoi and Serovo cultures were transformed as a result of mutual influence. The complex economy combined hunting and fishing. The materials from the Ust-Isha cemetery and Nizhnetyteskenskaya Cave-1 burial provided the most convincing evidence for such a development, though these sites were located in the northern Altai, rather than in the Cis-Baikal.

3. The Kitoi sites have been located throughout a vast geographical region. The broad dissemination of this culture is reflected by the fact that certain elements of the Kitoi material culture and burial practice have been reported from Neolithic sites in Yakutia, Trans-Baikal, and northeastern Mongolia.

It should be noted that this paper deals with preliminary age estimates and the chronometric affiliation of archaeological events. It cannot be excluded that the early uptake of the period of the Kitoi Culture's existence may be considered as early as the Upper Paleolithic, when the microlithic strategy of core reduction and the treatment of stone implements first appeared.

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LABRETS IN THE CULTURES OF THE NORTH PACIFIC

Introduction

The facial decorative articles known as labrets are well known from ancient cultures of the North Pacific. Labrets may be considered a reliable indicator of certain ethnic affinities. Travelers of the 17th – 19th centuries reported that the habit of wearing labrets was widely spread among the Aleuts, Eskimos, and Indians of the northwestern America.

These decorations were first mentioned in reports of Russian explorers of the 17th century who first reached the easternmost areas of northeastern Asia and communicated with indigenous populations. During his travels on the Chukotka Peninsula, S. Dezhnev encountered people on Cape Nos, whom he called "toothed Chukchi" (Narody Sibiri, 1956: 940 – 943). He gave them such a name because many of them wore protruding labrets, or bone sticks, in their lower lips.

Russian sailors and seal hunters reported from the Aleutian Islands that the local population decorated their faces with labrets (Berg, 1924: 118 – 122; 1946: 285 – 292). Other sailors and travelers (Wrangell, 1839: 54 – 82; Sarychev, 1952: 144 – 174, 183 – 208) and missionaries (Veniaminov, 1840: 86 – 87; 112 – 113) provided similar evidence on the Aleut people wearing such facial decorations.

L. Voronin, an artist with the Northeastern Geographical and Astronomical Expedition (1785 – 1795), drew many sketches showing the Aleutians with their lips and noses decorated with labrets of various forms (see (Liapunova, 1987: 47) and Fig. 1). In 1778, J. Weber, an artist with the expedition headed by Captain J. Cook, drew sketches of the Aleuts from Unalashka Island with their noses and lips decorated with labrets (Ibid.: fig. on page 47; Cook, 1971: 339 – 347).

The Russian travelers named these facial decorations in various ways: pins, insets, plugs, *koliuzhiny*, *sukli*, etc. (Veniaminov, 1848: 112). Jochelson (1925) proposed the special term "labrets," during his field investigations in the Aleutian Islands in 1909 – 1910 and it has been used in scientific literature since then.

Archaeological investigations carried out on the Aleutian (Ibid.; Aigner, 1966) and Kuril islands (Baba, 1934, 1939; Kodama, Oba, 1958), and in Alaska (Laguna, 1934; Bandi, 1969) provided evidence of the origin of the tradition of labret wearing. Labrets were recovered from all the noted culture-bearing horizons of the Chaluka site on the Aleutian Islands. The earliest of them were dated to the time range of 1724 ± 55 to 1198 ± 59 yrs BC (Aigner, 1966).

Labrets have been known in ethnological and archaeological records for a long time, but even now labrets are considered to be exotic articles and their semantics and purpose are not clear. No thorough publications have been issued dealing with the origin, meaning, and purpose of these decorative articles. Jochelson (1925: fig. 84 – 93) provided the most detailed description of a set of eleven labrets, which he collected from the Aleutian Islands in 1909 – 1910. S. Kodama and T. Oba (1958) published a report summarizing available information on the labrets collected from the Aleutian and Kuril Islands and of those recovered from the Moyoro shell midden on Hokkaido Island. These two researchers used the data provided in the works by Jochelson (1925), Veniaminov (1840), Sarychev (1952), and Berg (1946). The authors proposed a classification of labrets into several types (Kodama, Oba, 1958: 275 – 277) as well as the ways of fastening the labret on the face (Ibid.: 274 – 275). However, their major topic was the description of the

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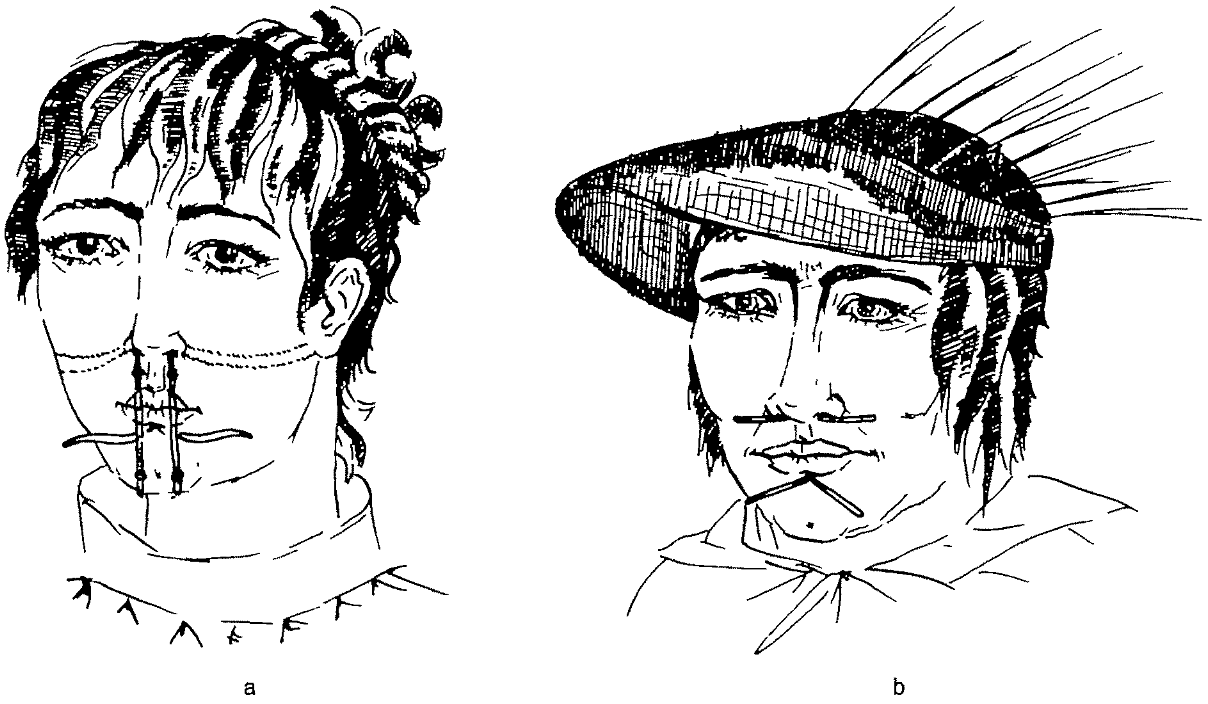

Fig. 1 A young girl (*a*) and a man (*b*) from Unalashka Island.
a – a sketch by J. Weber, an artist of J Cook' expedition (after (Liapunova, 1987)); *b* – a sketch by L Voronin, an artist of N.I Billins – G A Sarychev's expedition (after (Liapunova, 1987)). Graphic outlining by Y V Tabareva

results of excavations carried out at the Moyoro shell midden in 1947 – 1948. The site was located in the environs of the Abashiri settlement site, attributed to the Okhotsk Culture (the first half of the 1st millennium AD). This publication also contains descriptions of anthropological materials recovered from this shell midden. Analysis of available crania of adult males yielded characteristic features, which were compared to the craniological series of the Ainu and Aleut populations. These comparisons attested to the Aleutian affinities of the Moyoro population and a complete difference from the Ainu ((Ibid.: 290 – 292); for a critical review see (Vasilievsky, 1973: 193 – 194; Vasilievsky, Golubev, 1976: 170 – 171).

Recently labrets have been reported from Kamchatka (Dikov, 1971: 16 – 17; 1977: 84 – 86, plate 25, *10*; 1979: fig. 21, *7*); the Taimyr Peninsula (Khlobystin, 1972: 104 – 105, fig. 31, *26*, *27*); and the Lower Amur Basin (Medvedev, 2000: 66, fig. 9). Each author claimed an older age for his discovery and for the initial appearance of such facial decorations in northeastern Asia and northwestern America, and hypothesized about the place of origin of this tradition. However, not all reported items may be regarded as true labrets; their definition needs specification. The chronological affiliation of labrets, their origin, and semantics represent debatable topics even today.

Locations and descriptions of labrets

Presently, about one hundred labrets have been deposited in museums and university centers in Russia, the USA, and Japan. The present article deals with the labrets obtained as a result of excavations and from surface collections. The Aleutian Islands collection seems to be the richest of these. Jochelson (1925: 100 – 113, fig. 84 – 93) discovered eleven complete labrets, as well as fragments (Fig. 2), at the Aglagah settlement on Umnak Island and at the Atkalah cave site on Atka Island. A. Hrdlička, T. Benk, and A. Mei also reported labrets discovered in caves containing human mummified remains located on the Kagamil and Ilak islands ((Aigner, 1966: 66), W. Laughlin, pers. communication). Excavations at the Chaluka site on the southwestern extremity of Umnak (the Aleutian Archipelago) also yielded a rich collection of labrets (Ibid.: 57 – 83) (Fig. 3).

Labret-shaped decorative objects were also reported from the Eskimo culture to the east and northeast of the Aleutian territories: Kachemak I, Ipiutak, Norton, Okwik, and Birnik, located in southwestern and northern Alaska (Bandi, 1969: 93 – 95, 113 – 124, fig. 31, 51). However, all references are made to solitary examples, the only exception being the collection of labrets from Cook Inlet, comprised of eleven complete specimens

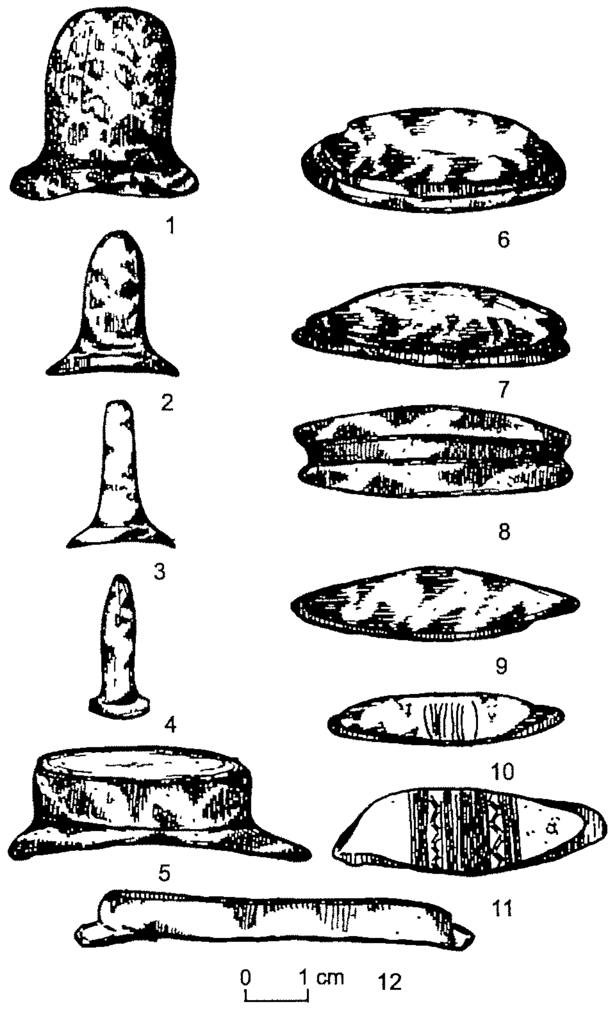

Fig 2 Labrets from the Aleutian Islands (after (Jochelson, 1925))

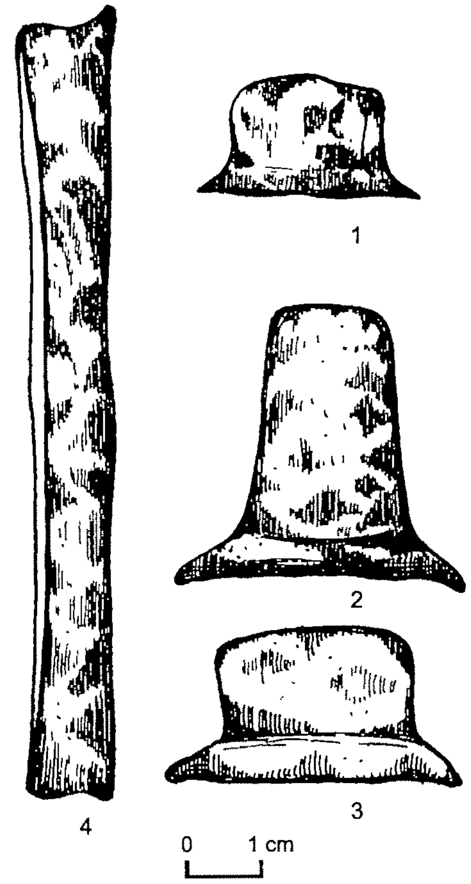

Fig 3 Labrets from Chaluka, Umnak Island (after (Aigner, 1966)).

and a few fragments (Laguna, 1975: 204 – 206, fig. 51, 17 – 36) (Fig. 4).

The Kuril Islands are also included in the area of dispersal of the tradition of facial decoration with labrets. In 1933 – 1938, O. Baba, a Japanese archaeologist, carried out archaeological excavations on Shumshu, Paramushir, and Iturup islands. In the course of excavations of shell middens and ancient semi-subterranean dwelling pits, Baba recovered four labrets along with Okhotsk ceramic ware and lithic tools (knives, arrow- and javelin heads, scrapers); two labrets were reported from Shumshu and two specimens from Paramushir (Baba, 1934: 39 – 63; 1939: 51) (Fig. 5, *5*, *7*). During World War II, K. Kikuchi, a member of the Laboratory for Archaeology of the Institute of Northern Cultures at Hokkaido University, recovered three labrets 1.2 – 1.5 m below the surface in O. Baba's excavation trench (Kodama, Oba, 1958: 280, fig. 3) (Fig. 5, *1* – *3*). Kodama and Oba reported that another two labrets were deposited in the Laboratory of Hokkaido University. One of these labrets was found on Shumshu Island, the second one either on Kunashir or Urup (Ibid.: 281 – 283) (Fig. 5, *4*, *6*). Kodama and Oba provided detailed descriptions of three labrets and one labret fragment recovered from the Moyoro shell midden in northern Hokkaido in the course of the excavations of 1947 – 1948, jointly carried out by Tokyo and Hokkaido Universities (Kodama, Oba, 1958: 273 – 279) (Fig. 6).

The discovery of labrets on Hokkaido was a surprise for archaeologists of Japan. Firstly, the Moyoro labrets show many similarities to the Aleutian specimens described by Jochelson. Secondly, these adornments were discovered far south of the Aleutian Islands. And thirdly, the labrets were recovered from a shell midden in association with human burials that yielded cranial remains attesting to Aleutian affinities. This discovery inspired a debate on various hypotheses about cultural-ethnical links having existed between the northern and southern regions of the North Pacific (Arutiunov,

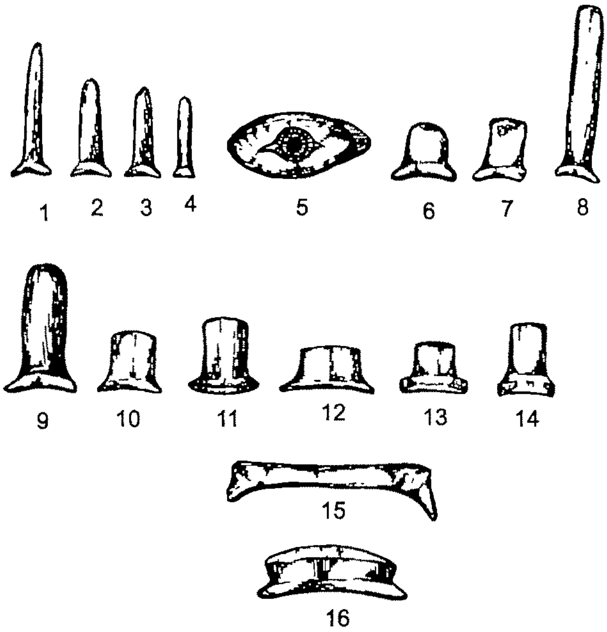

Fig 4. Labrets from Cook Inlet (after (Laguna, 1975))

Sergeyev, 1969: 110; 1975: 184 – 191; Vasilievsky, Golubev, 1976: 173 – 189; Chester, 1962: 64 – 99; Bandi, 1969: 93 – 98; Befu, Chard, 1964: 3 – 18; Black, 1983: 49 – 78). Experts stressed an original design of the recovered labrets that made them look different from other facial decorative articles reported from northern cultures.

Labrets reported from the Pacific coast, from North Alaska to Hokkaido, may be classified into six principal types: (1) hat-shaped items (see Fig. 2, *1, 5*; 3, *1 – 3*; 4, *6, 7, 10 – 14, 16*; 5, *1 – 4*); (2) cuff-link shaped (see Fig. 2, *6 – 8*; 6, *1 – 3*); (3) bottle-stopper shaped (see Fig. 2, *2 – 4*; 4, *1 – 4, 8, 9*; 5, *7*); (4) ellipsoidal (see Fig. 2, *9 – 11*; 4, *5*); (5) boat-shaped (see Fig. 2, *12*; 4, *15*; 5, *6*); and (6) long, rectangular specimens (see Fig. 3, *4*).

Labrets included in each category vary in size and may be symmetrical or asymmetrical. For instance, some hat-shaped labrets have a height equal to the diameter of the base (4 × 4 cm) (see Fig. 3, *3*; 4, *13*); the base diameter of others is less than their height (1.5 × 3 cm; 1.2 × 4 cm) (see Fig. 2, *5*; 4, *16*); still others have a height greater than the diameter of the base (see Fig. 2, *1*; 3, *2*). Projections at the labret base may be symmetrical or asymmetrical (see Fig. 4, *8, 9*; 5, *2*). The category of stopper-shaped labrets demonstrates the greatest variability in size; their height varies from 4.6 cm to 1.2 cm (see, e.g., Fig. 4, *1 – 4, 8*). The labrets of the rectangular category reach a length of 15 to 18 cm (see Fig. 3, *4*).

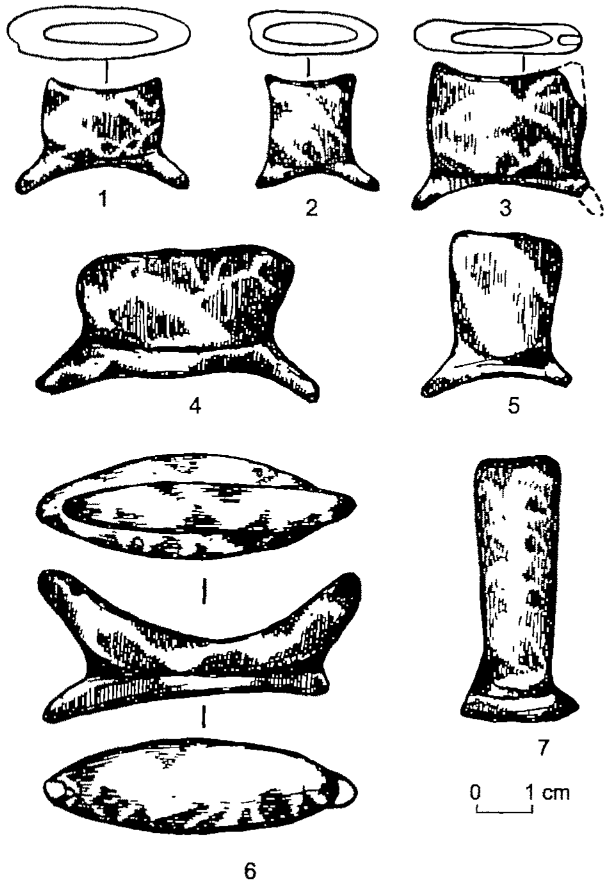

Fig 5. Labrets from the Kuril Islands (after (Kodama, Oba, 1958))

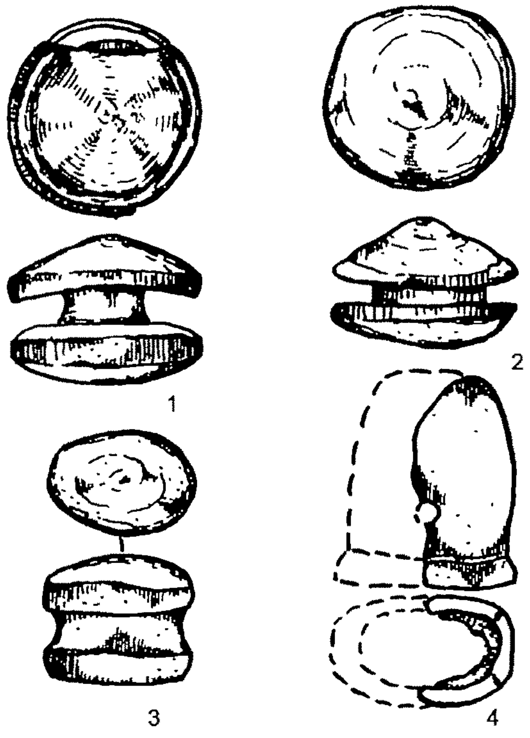

Fig 6. Labrets from Moyoro shell midden (after (Kodama, Oba, 1958)).

Certain specimens demonstrate shallow holes on their upper surface. Stones, gems, or even shells of unusual shape and color were inserted into these holes. A hat-shaped labret (3.5 × 1 5 × 3 cm) recovered from the Chaluka site, stratum 2, on the Umnak Island was reported by J. Aigner (1966: 66) to have a diamond inserted in such a hole in its upper part. Aigner also cited W. Laughlin's personal communication that A. Mei had discovered a similar labret painted red and green and decorated with a diamond. The labret was recovered in association with mummified human remains from a cave on the Kagamiya Island (Ibid.). Laughlin also referred to similar finds of labrets incrusted with pieces of amber and rock crystal This discovery was made by A. Hrdlička on the Aleutian Islands in 1936 – 1938.

Ornamented labrets present particular interest. Jochelson (1925: fig. 84, 88) published sketches of two specimens recovered from the Atkalah site on Umnak and from a cave site on Atka. These well-polished labrets are made of milky (smoky) marble One of the surfaces bears an incised geometrical motif (see Fig. 2, *10, 11*). A labret from Cook Inlet displays an even more perfect form and sophisticated design (Laguna, 1975: 256, plate 51, fig. 21). This perfect adornment was cut out of a walrus tusk, thoroughly polished, and bore an image of an eye reminiscent of the Egyptian style. The image shows eyelashes and eyelids, a shallow hole probably left by a gemstone marks the pupil, (Fig. 4, *5*). Other types of labrets were encountered bearing additional perforations for fastening pendants.

Labrets were manufactured from walrus tusks, whale, sea lion, deer, and bird bones, as well as from gemstones, shell, and shale The Eskimo labrets are mostly made of walrus's tusk (Ibid.· 256, plate 51, fig 19, 21, 27, 31, 35), though light-colored marble labrets (Ibid.: fig. 20) and shale specimens (Ibid.: fig. 30, 32, 34) have also been found. The Aleutian collection of labrets includes mostly bone labrets (see Fig. 2, *1 – 8, 12*; 3, *1 – 4*); three marble specimens have been also reported (see Fig. 2, *9 – 11*). Labrets from the Kuril Islands were mostly manufactured of reddish siliceous schist (Kodama, Oba, 1958: 280 – 283). The Moyoro collection from the shell midden is comprised of bone labrets (Ibid.: 278 – 280).

Chronometry, origin, and semantics

It was believed for a long time that the tradition of wearing labrets originated around the beginning of the Common Era. However, excavations of the Chaluka settlement provided contradictory evidence. Aigner (1966) reported that the site yielded four culture-bearing horizons, for which a series of radiocarbon dates were generated. The chronometrical analysis has shown that for about one thousand years (from 1724 ± 55 till 716 ± 57 yrs BC (strata IV – II)), Chaluka was continuously populated. The overlying layers are suggestive of a hiatus in human occupation of about 1.2 thousand years (from 716 ± 57 yrs BC until 506 ± 47 yrs AD). Around AD 500, the site was reoccupied and human habitation lasted continuously until the European invasion (stratum 1) (Aigner, 1966: 57 – 83). Labrets were encountered in association with all stratigraphic layers, and specimens recovered from strata IV – II showed similarity of forms (hat- and cuff-link shaped). Stratum I yielded large rectangular objects. The available evidence suggested that the tradition of wearing labret decorations was practiced as early as four thousand years ago by the Paleo-Aleuts.

The available radiocarbon dates for the Lower Chaluka site (strata IV – III), falling in the range of 1724 ± 55 – 1198 ± 50 yrs BC, are well correlated to the archaeological and stratigraphic data, thus bracketing the earliest age estimate for the time of the labret's origin in the North Pacific. Attempts to refer the time of existence of this tradition in northeastern Asia to earlier periods have not yet found any reliable support. N. Dikov (1964: 11) reported a stone labret found within the Neolithic technocomplex of the Kamchatka River. Later, in his review of archaeological sites located in Kamchatka, Chukotka, and the Upper Kolyma Basin, he did not mention any labrets in the Kamchatka Neolithic collections, though the list of finds recovered from the Zastoichik site contained a reference to a labret-like pin (?) of siliceous schist (1977: 86, plate 25, 10). In 1971, Dikov (1971: 16 – 17; 1979: 54, 60, fig 21, *7*) wrote that a steatite implement reminiscent of a labret was recovered from a layer attributed to the late period of the Ushki Upper Paleolithic culture (10,860 ± 400 BP, 10,360 ± 345 BP). The shape of this specimen is similar to a labret, though it is not quite the same. That is why Dikov referred to this object as a "labret-like" implement rather than a labret itself. However, he did not hesitate to infer that "the ethnic community in question [the Ushki population – **R.V.**], whose characteristic feature is the tradition of wearing labrets, is affiliated to the earliest Eskimo-Aleut people" (1979: 280). The idea of regarding Kamchatka as the birthplace of the rite of wearing facial decorations seems tempting, but it is not based on reliable archaeological and ethnological evidence.

General patterns and the specificity of cultural-historical development within different environmental and climatic zones suggest that the origin of the tradition of facial decoration should be searched for not in northern areas of severe living conditions, but somewhere in the south where such traditions are more pronounced. Oceania seems to be such an area, especially the region populated by indigenous Papua-speaking tribes. These people have preserved the old tradition of painting their faces and decorating their noses and lips with various pins during ethnic dances (see (Strany i narody mira..., 1981: 143 – 144)). Throughout history, various contacts and interrelationships occurred between culturally different populations of Southeast and East Asia. Cultural impacts reached China, Japan, and the Amur River basin (see (Kabo, 1969: 300 – 328; Okladnikov, 1971: 114 –117)).

As a result of such contacts, the tradition of decorating human faces might have been borrowed by the population of Japan. The Jomon Neolithic cultures seem to be the most probable generator of the tradition of wearing labrets.

G. Munro (1911: 225, 260, fig. 149, 161) surmised that inhabitants of the Japanese Islands might have worn labrets as early as the Neolithic. He based his hypothesis on clay figurines (*dogu*) showing thin incisions at the corners of the mouth, probably representing tattoo or piercing marks. Recently, Munro's hypothesis has been supported by new facts.

Clay toadstool-shaped labrets were reported from certain Late Jomon sites (2000 – 1000 yrs BC) located on Hokkaido and in northeastern Honshu (Natori, Matsusita, 1973: 188 – 190, 195). The upper surfaces of their caps show ornamentation motifs. The motif consists of concentric stylized rhombuses, a dot marks the center of the whole motif. Some motifs have a dot in a circle as the central portion of the composition (Vasilievsky, Lavrov, Chan Su Bu, 1982: 158, fig. 70, 2, *3*). This latter motif is reminiscent of the Eskimo typical "eyed" motif of the Ancient Beringia-Okwik period (Arutiunov, Sergeyev, 1969: 170, fig 52, 93; 1975, fig. 44, 49, etc.). The *dogu* clay figurines demonstrate ornamentation with incised lines and dot impressions suggesting labret decorations (Vasilievsky, Lavrov, Chan Su Bu, 1982: 159 – 168, fig. 71 – 73). Japanese researchers regard impressions on faces and abdomens of *dogu* figurines as tattoo imitations (Takayama, 1970: 210 – 212). It should be noted that ethnologists recorded tattoo marks on human faces, chins, noses, ears, and by the angles of the mouth. In some cases tattoos were made in places where labrets and ear-rings are worn, coinciding with the vitally important points established in oriental medicine. C. Serizawa, T Esaka, and I Yawato believed that people wore tattoos, including facial tattoos, as early as the Jomon period (Ibid.: 16 – 24). Some *dogu* specimens from Hokkaido and Honshu bear traces of black and red (ocher?) paint (Noguti, 1976: 55, 75).

Ethnological records also provide evidence on the relationships between tattoos and labrets. I. Veniaminov lived in an Aleutian settlement for ten years (1824 – 1834) and studied their way of living, habits and rites. He wrote:

> Women pierced nasal cartilage, ears, and lower lips. They wore ear-rings, and *sukli*, 'labrets', in the lower lip. Some labrets were decorated with rock crystal. Women's necks, arms, and even ankles were decorated with strings of beads made of gem stones, especially of amber, and bone charms (Veniaminov, 1840: 112).

Such strings of beads were rather expensive (Ibid.). Besides the mentioned decorations, women used to wear tattoos on their faces (Ibid.: 113). Chins were usually tattooed with two or three lines and noses bore one longitudinal and two transversal tattooed lines ((Ibid.: 9), see Fig. 1). More sophisticated designs were also recorded. Veniaminov reported: "Sometimes beauties and daughters of rich and honorable families wore tattoos illustrating heroic deeds of their fathers, grandfathers, and uncles; for instance, how many enemies were killed by a particular ancestor in battles, or how many strong animals were hunted" (Ibid.). The complexity of a design depended on the characters of a heroic deed (Ibid.). During his stay on Unalashka Island in 1792, G.A. Sarychev recorded the tattoo design of a young noble (?) Aleut girl. Women wore tattoos in a combination with labrets (Sarychev, 1952: 208 – 218, 288 – 289). Men also wore labrets, but did not wear tattoos on their faces. Veniaminov (1840: 112) reported: "Men pierced their lower lip, nasal cartilage, and ears. They wore two *suklis*, in which the outer tips were turned up, or one labret shaped as a button or cuff link...the nasal cartilage was pierced with one bone pin." No distinctions between male and female labrets were recorded, though the number of holes for fastening (insertion) facial decorations was different: women might have up to six holes in comparison to two or three for men (Berg, 1924; Laguna, 1975: 205). Piercing was done in childhood. At first, wooden sticks were inserted, which were changed to stone or bone labrets when a person had come of age. Labrets, like tattoos, were the signs of nobility. A Russian merchant from the Selenge basin, A. Tolstykh, organized several trade and hunting voyages to the Attu and Atattu Islands in the period of 1749 – 1766. During these expeditions, Tolstykh made friends with the Aleut population and carried out ethnological observations: "These decorations [labrets – **R.V.**] are traditionally perceived by the local population as signs of gratitude for social merits of the whole family" (Berg, 1924: 118 – 122).

Ethnologists who studied the religions of Eskimo, Chukchi, and Aleut people regarded labrets as amulets and referred to them as a part of a whole system of shaman ideology (see, e.g., (Bogoraz, 1939: 75 – 78, 117 – 118; Jochelson, 1904: 33 – 41)). However, Veniaminov (1840: 86), who witnessed ritual performances with labrets, wrote: "Nobody ever performed any shaman ceremonies during such rituals. Usually people put on some historically based traditional play." Festivals with performances representing scenes of glorious feats of ancestors usually went on during winters in one village or another. People gathered in one *barabora* (subterranean dwelling); each village tried to outdo the others in performances, acting, and cheer" (Ibid.). Two actors performed principal characters in special festive costumes, which were exceptionally large and stuffed with straw (Ibid.). Plots of such performances bore dualistic features reflecting an opposition of good and evil forces. In most traditional myths of the peoples of Northeast Asia and Northwest America, good wins over evil (Zolotarev, 1964: 132 – 139, 257 – 260). During the fight between the two giants, other people at the festival danced, beat drums, and sang songs. People wearing labrets occupied the best places. All the people on the stage wore masks decorated with labrets (Ibid.: 97). Performances lasted for several days (Ibid.).

Conclusion

Several principal types of labret shapes may be established on the basis of analyses of all the specimens known at present: hat-shaped, cuff-link shaped, bottle stopper shaped, ellipsoidal, boat-shaped, and long rectangular items. Some specimens show decoration in the form of encrustation with gemstones or clamshell of rare species. Labrets having incised motifs were also encountered. Labrets were made of walrus tusk, bird and animal bones, stone, and clamshell.

The question of the place and time of the origin of the tradition of wearing labrets is still unsettled. Available archaeological and ethnological evidence, together with environmental and climatic data suggest the southern Pacific, in particular Oceania, as a possible place of origin of this tradition.

In the process of cultural interrelationships, the rite of wearing facial decorations reached Japan. The Jomon Neolithic cultures of Japan seem to represent the most probable source of the labret's origin. Late Jomon sites on Hokkaido and Honshu yielded clay labrets in association with clay female *dogu* figurines. Some *dogu* demonstrate incisions and dot imprints on their chins, at the corners of the mouth, along the nose, and on the ears. Japanese researchers interpret these signs as a tattoo imitation. It is noteworthy that the tattoo area on women's faces as shown on dogu figurines coincided with the areas of traditional placement of labrets and earrings.

It seems that tattoo and labret decorations were made in order "to illustrate heroic deeds of the person's father, grandfather, and uncles." Stage performances with labrets also represented ancestors' heroic deeds and historical events of the past. Such festivals had nothing in common with shaman rituals. The Aleutian Islands and the Cook Inlet yielded the greatest number of labrets. Many researchers believe that the tradition of wearing labrets extended to northern Alaska.

Labrets and tattoos represent the remains of ancient traditions whose semantics have been transformed throughout history, and were still in use as recently as the 17th – 19th centuries.

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TENTATIVE RECONSTRUCTION OF PREHISTORIC SKIN PROCESSING (based on the materials of the Upper Paleolithic site Ui I on the Enisei River and ethnoarchaeological data)

Introduction

The reconstruction of prehistoric skin processing and clothing production has attracted archaeologists for a long time. In 1991, in Ólzat in the Alps, the sensational discovery of a prehistoric man's remains preserved in ice dating to approximately 3000 BC (Spindler, 1996) renewed interest in this issue. Most of the preserved articles of clothing and utensils (a hat, a belt, a coat, a quiver, and other items) were made of leather. Skins of both wild (bear and fallow-deer) and domestic (goat and cow) animals were used for dressing. For earlier periods, there exists only indirect evidence allowing judgments on the nature of skin processing. In connection with this, data from the Siberian Upper Paleolithic site Ui I, investigated by S.A. Vasil'ev (1996), present considerable interest.

Information about skin processing can be obtained by studying articles made of stone and bone (Semenov, Korobkova, 1983; Sidéra, 1989; Philibert, 1993; Beyries, 1997a; Texier et al., 1996). In doing so, it is important to take into consideration such characteristics as the materials the tools were made of and the size and shape of the working edges, as well as use-wear patterns (Fig. 1). Using the quantitative data, the function of the tools can be identified and the stages of the production process can be singled out (Beyries, 1997b). Such a study can be conducted by running an experiment aimed at the reconstruction of probable processing techniques. Experiments make it possible to determine the role of different tool parameters (weight, size, shape, etc.). Of no less importance is the observation of the actual production process when connections between the processing techniques and a number of external factors are defined, such as the environment, social organization, production demands, practical skills, the work setting, traces left in the ground, and others (Beyries, 1993, 1995, 1997b).

The latter approach is interesting as well as promising, since it allows researchers to link the behavior of prehistoric man to the archaeological remains. In this article, evidence from the site of Ui I will be considered followed by ethnoarchaeological observations. Finally, an attempt to make a correlation between these observations and archaeological data will be made in order to reconstruct the production processes in which the prehistoric inhabitants of the site were involved.

Description of the site

The site is situated on the upper reaches of the Enisei River, on the right bank of the Ui River, 500 m from the Maininskaya Hydroelectric Station. In this article we will

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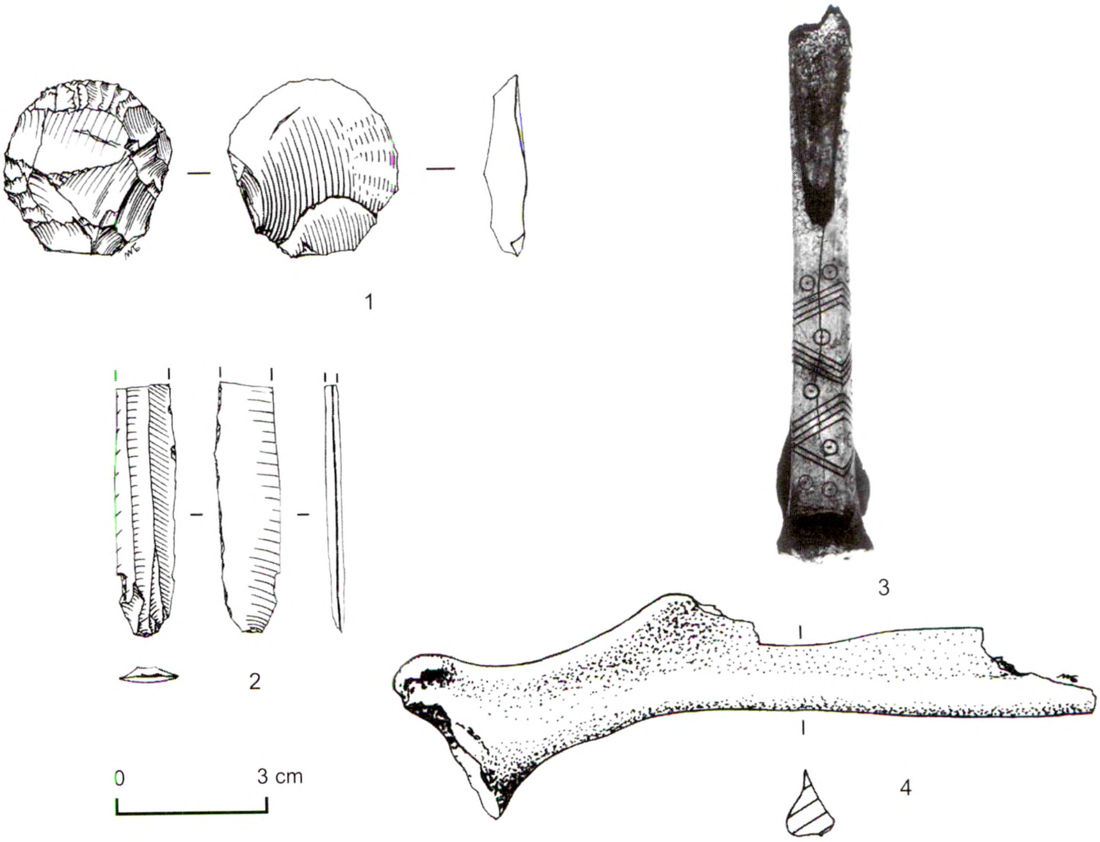


Fig. 1. Skin processing tools

1 – flint end-scraper from the Kokorevo I site (after (Abramova, 1979)); *2* – flint blade from Jeitoun, western Central Asia (after (Masson, 1971)); *3* – bone scraping tool from Lundara, the Manitoba Province (after (Steinbring, 1966)); *4* – bone scraper from Jeitoun.

only consider the materials from the second horizon of culture-bearing layer 2, which dates to 17 – 22 thousand years BP. Here accumulations of boulders and tabular stones, as well as faunal remains (most probably bones of Asiatic wild ass, red deer, bison, Siberian ibex, and wild sheep or ibex) occurred in large quantities.

Of particular interest are the remains of an oval-shaped construction which consisted of 21 rib fragments of an animal (most probably bison, ibex, wild sheep or ibex). These ribs (9 to 27 cm in size) were stuck into the ground either vertically or at an angle. The distance between the ribs ranged from 5 to 15 cm, except for the southern part, where the distance between the ribs was 60 to 80 cm. The construction under discussion can be considered as a device for skin drying: similar constructions are known from ethnographic materials from Northeast Asia (Chukchee) (Narody Sibiri, 1956) and North America. To the west and east of this construction there were two charcoal spots. Unfortunately, attempts to identify the species of the charcoal failed.

The layer revealed an impressive lithic industry represented by 851 artifacts. The percentage of finished tools is low (4.8%, 41 specimens). The collection is dominated by end-scrapers on bladelets and round flakes (24% of all the tools). The end-scrapers can be grouped into small (length less than 3 cm) and large (length exceeding 5 cm) categories. Chisel-like tools, retouched blades and flakes, points, side-scrapers, denticulated and notched pieces, and others were also found here. The artifact complex is also comprised of a fragment of antler point and a bone tool showing traces of retouch.

Ethnoarchaeological data

Given below are descriptions of three skin processing techniques used by the Indians of Northwest Canada (the inland Salish and the Athapaskan; data of S. Beyries) and the Koryak of the Far East (the data of F. David, K. Carlen, V.I. Diachenko, and Y.V. Chesnokov).

Ethnographic groups

The Athapaskan. The groups under study inhabit the foothills of the Rocky Mountains at an altitude of about 250 m. This region is covered by coniferous forests.

In the past, the Indians were semi-settled hunter-gatherers. Their traditional economy was based on red deer, moose, reindeer, mountain goat, bear, wolverine, and beaver hunting. The hunting area exceeded 10,000 sq. km. Plants were less extensively used: berries were gathered; tree bark was used for making cookware and baskets (Beyries, 1997a). Currently, skins are processed almost solely by women (moccasin manufacturing).

The Salish from inland Canada. The settlements under study are situated on a plateau to the west of the Rocky Mountains (Richard, Rouseau, 1987). It is a region of coniferous forests. Until the 19th century the population was represented by semi-settled fishermen and hunter-gatherers (Drake-Terry, 1989; A complex culture..., 1992; Beyries, 1997b). Vegetative resources were widely used year- round. Plant roots, bulbs, stems, sprouts and berries were used for food. Baskets, totems, boxes and boats were made of bark; vegetable fibers were used for clothing manufacturing. The area of foraging reached 1000 sq. km (Turner, 1992). Currently, salmon fishing forms the basis of the tribe's economic life. Not only the meat and caviar are used, but also the bone, fat and skin; the last is used in the manufacture of various containers (Teit, 1906; Romanoff, 1985, 1992; Alexander, 1992, Kew, 1992; Beyries, 1995). Moose and red deer, abundant here, are the primary objects of hunting (Kennedy, Bouchard, 1992). Until the beginning of the 20th century, such animals as lynx, hare, marmot, porcupine, squirrel, and others were also hunted

Presently skin processing is of secondary importance. Women are involved in the home manufacturing of moccasins and traditional holiday clothing. This activity is of particular social importance because of the custom of *potlatch.*

The Koryak mainly inhabit the northern part of the Kamchatka Peninsula, a land of tundra and forested river valleys. The basis of the Koryak economic life is formed by two mutually complementary activities. Sedentary coastal dwellers are engaged in sea-mammal hunting and fishing, while inland inhabitants are reindeer-herders who used to be nomadic but now lead a sedentary life. They also fish salmon and hunt elk, and sometimes bear, in the settlements' environs. Nowadays only the reindeer-herders move with their herds of domestic reindeer. Vegetal resources are used both for food and technical needs. Traditional Koryak culture is based on reindeer exploitation. Not only economic use is meant here, but also the special role this animal plays in the cultural and spiritual life of the Koryak. The Koryak have a complex skin processing system in which only women participate; saddle manufacturing is an exception. It is interesting to note that there exists a connection between the immediate and extended patriarchal family and reindeer: all stages of life, from birth to death, are associated with the image of this animal.

Skin processing techniques

Skin processing techniques used by the two Canadian groups differ only at their early stages (skinning and unhairing). Other operations such as greasing, soaking, drying, softening and smoking are performed in similar ways, thus they are described together.

The Salish· skinning and unhairing. Processing an average-sized skin starts with stretching it over a wooden base. Regardless of its size, wet or dry skin is put on a wooden convex support for dressing. Skinning and unhairing are done with the help of the same tools. To dress the skin, tools with straight or slightly convex working edges are used. The base supported by poles is placed at a 45° angle to the ground. The skin is laid on the base, and a sitting craftsman presses it with the weight of his body. Though metal tools are widely used nowadays, bone implements made of moose ribs, radii or shoulder blades are also utilized (Masson, 1889, Tepper, 1994; Beyris, 1997b). The skinning and unhairing usually take place close to a water source, since it is necessary to constantly soak the skin.

The Athapaskan: skinning and unhairing. The skin is placed on a wooden stand (Fig. 2). The size and shape of the stand depend on the type of skin (moose, deer, beaver, etc.). This construction is attached to a tree and fixed with several pegs. Fresh skins are usually processed immediately. If a skin cannot be used for dressing immediately, then it is left to dry and soaked later. When dressing average-sized skins (beaver or roe deer) the craftsman stands facing the stand; if skins of larger animals (moose) are dressed, the craftsman sits down on the stand.

A bone tool made of a moose or red deer metapodium is used for skinning To make fleshing easier, one end of the tool is skewed and jagged. A rope is tied to the other end. The tool is held in the hand or with the rope. The movements should be quick and uniform. The middle part of the tool's working edge touches the processed surface. The described tool finds wide application and has not been completely replaced by metal tools yet.

Unhairing is performed on the same stand, but it has to be turned for this operation. This method requires special skill; otherwise thin skin can easily be torn. In the past, thick stone tools were used for the dressing of thick skins, while now metal tools are usually used for this operation. The tools are heavy, weighing approximately 500 – 550 g. Thick parts of the skin, such as the neck, the area around the spine, and the withers must be thoroughly soaked. The craftsman has to put all the weight of his body on the edge of the tool. The working edge of the tool bears traces of use-wear in its middle part (Beyries, 1997b).

To dress small skins (roe deer, beaver, and the like) similarly shaped but lighter tools, weighing 300 – 350 g,

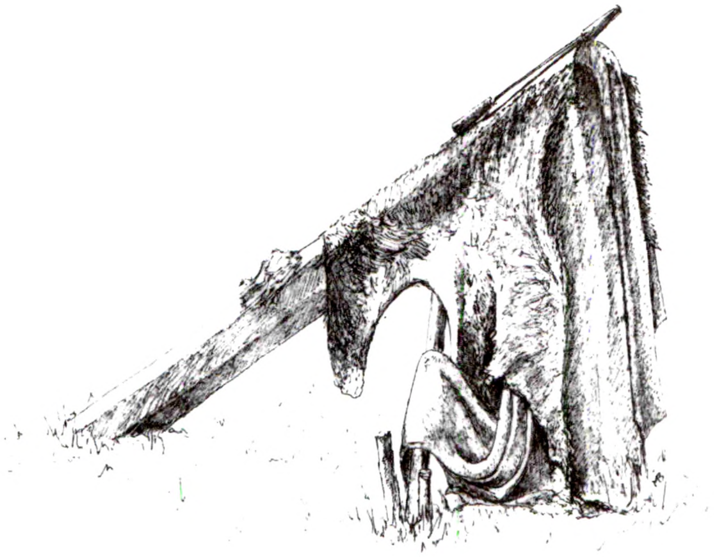


Fig. 2. Rod used for skin scraping (Canada).

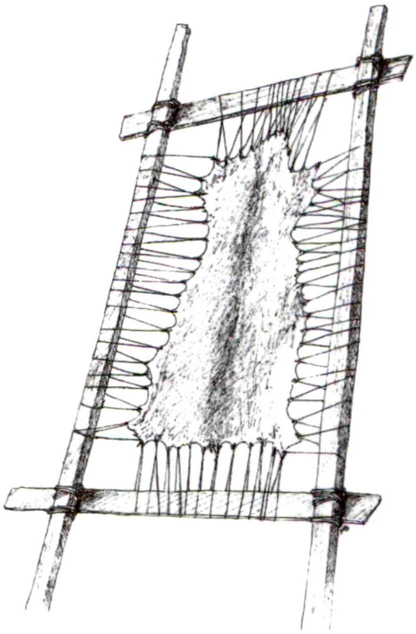


Fig. 3. Deer skin stretched over a small frame (British Columbia).

are used. The skins are attached to vertical frames (Fig. 3). The master stands facing the skin, holding the tool near its working edge in one hand and the tool's handle in the other. Movements are first directed along the skin; then gradually movements become semicircular and directed upward. When the working edge contacts the processed surface, the tool is held at an angle with the skin and sidestrokes are made. Signs of use-wear are scattered along the tool's edge (Ibid.).

All the described operations are performed in special places from which waste materials are periodically removed. From an archeological point of view, this type of production leaves only a few distinguishable traces. Only fragments of stone tool working edges and accidental bone artifacts (on the condition that the soil favors preservation of bones) can be encountered at such places. Wooden stands placed on the ground surface do not leave traces either.

In both groups, small skins such as squirrel are dressed with the help of pebbles (Fig. 4) which are used for the scraping of the inside of the skin surface in order to clean the viscera from it, while simultaneously softening it.

The Athapaskan and the Salish: greasing, softening, and smoking. After the skin has been cleaned, it is wetted and then dried. The next stage in skin dressing is greasing, usually with marrow. The duration of this operation depends on skin thickness and the air temperature. The thicker the skin and the cooler the weather, the longer the time required for skin dressing. The described method provides a means of producing high quality leather. It was observed (Villon, 1889) that skins processed with marrow are 35% more durable than those processed with vegetable oil.

Over a period of several days softening takes place. The skin is soaked and then crumpled before drying in order to make it elastic. The processing techniques depend on the season. In the warm season, from June to July, the skin is spread on the ground to dry in the sun and then it is stretched. Tree branches are used for stretching. Archaeologically, these production stages cannot be distinguished since wood is not normally preserved.

In autumn special fires are made with well-dried poplar wood which produces intense heat with a minimal amount of smoke. Over the fire, a quadrangular frame is constructed on which the skin is laid for several minutes. After that the skin is put on the ground for drying and stretching with the help of pegs. In the areas inhabited by the Indians, abandoned poles and oval fire spots left after the above-described activities are often encountered.

When the skin has almost completely dried, the process of softening starts. Depending on the skin's thickness, as well as the purpose of its dressing, the processing time varies from several hours to several days. The dried skin is stretched over a vertical frame. The craftsman stands facing this construction, using the same crank-handled implement as used for unhairing. To make the skin more elastic, he checks for wrinkles on its surface and tries to flatten them. The skin's flesh side is powdered with flour. The role of the latter technique remains unclear. In ethnographic literature (Narody Sibiri, 1956) it is mentioned that flouring is important for degreasing, but the same procedure is also used at other stages of skin

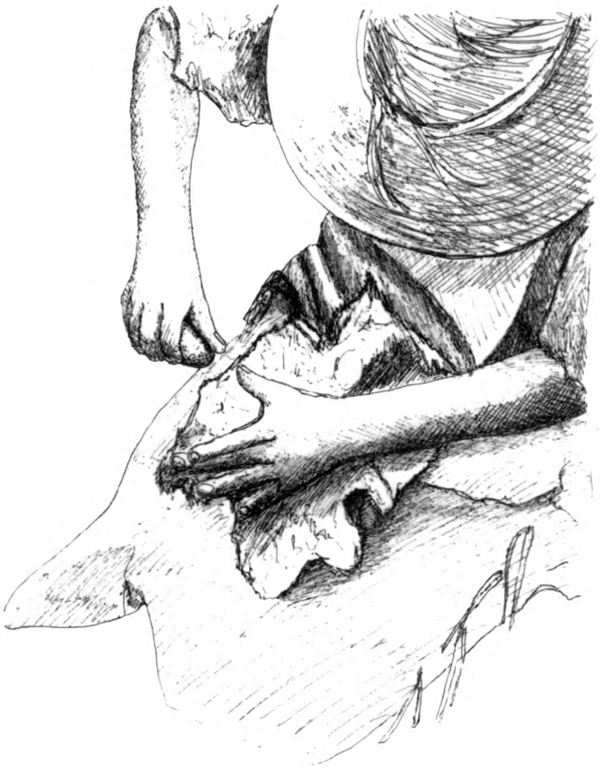


Fig. 4. Scraping a squirrel skin with a pebble (British Columbia).

processing. A medium-sized skin (of a small reindeer or roe deer) is spread upon a horizontally laid log. The craftsman holds the skin by hand and removes the flesh with a scraper, making lengthwise movements.

The skin processing finishes with smoking. The skin is placed over a smoldering fire to cover it with a layer of soot for waterproofing. For this purpose, the fire is made in a pit 20 to 30 cm deep, in order to avoid accidental sparks. Since a fire with a large amount of smoke and a small amount of heat is necessary for this procedure, rotten wood or bark is used as fuel.

The Koryak. Techniques used in processing the skin for manufacturing clothes, saddle, and *yaranga* (portable dwelling) covers are distinguished by a number of peculiarities.

First, the skin is stretched over the ground or the floor and processed with stone scrapers made of basalt, quartz or jasper. Then the cleaned skin surface is covered with reindeer feces mixed with the female's urine. In this condition a small skin is left in a warm place for one day, a medium- or large-sized skin for two days. If the skin is intended for making blankets or *yaranga* covers, then the skin dressing is considered complete at this stage. Skins intended for clothing are scraped several more times.

The skin is put on a board, one end of which is fixed with pegs dug in the ground, while the other end is placed on the craftsman's thighs. The angle between the board and the surface of the ground varies, depending on the pose of the sitting person. When small skins of young deer and *kamus* (skin from deer legs) are processed, the craftsman sits on the ground with his legs encircling the board, or he kneels. When working with the skins of adult animals, he sits on a box covered with a pillow, legs crossed under the board. The skin is pressed between the edge of the board and the craftsman's body. Under the processed skin another skin can be put on the board.

A tool with convex working edges (2 to 3 cm thick and 3 to 5 cm wide) is used for skin dressing. Light stone scrapers are convenient when scraping small skins, while heavier tools are used when scraping larger skins. The scraper is fixed in the center of a straight wooden handle. The craftsman holds the instrument by the two narrow ends. The tool is balanced in the center; the movements are directed from top to bottom of the skin. The scraper is held at an acute angle to the processed surface. Apart from the middle part of the working edge, a segment of the tool (2 – 3 cm) situated on its bottom surface touches the skin. Traces of use-wear are located in these segments of the tool (Fig. 5). The cleaned skin is softened without using any tools; it is tumbled with hands and legs. If it is necessary to smoke the skin, it is placed on *choum* (portable dwelling) covers. To color the skins, finely shaved alder bark infused in urine is used.

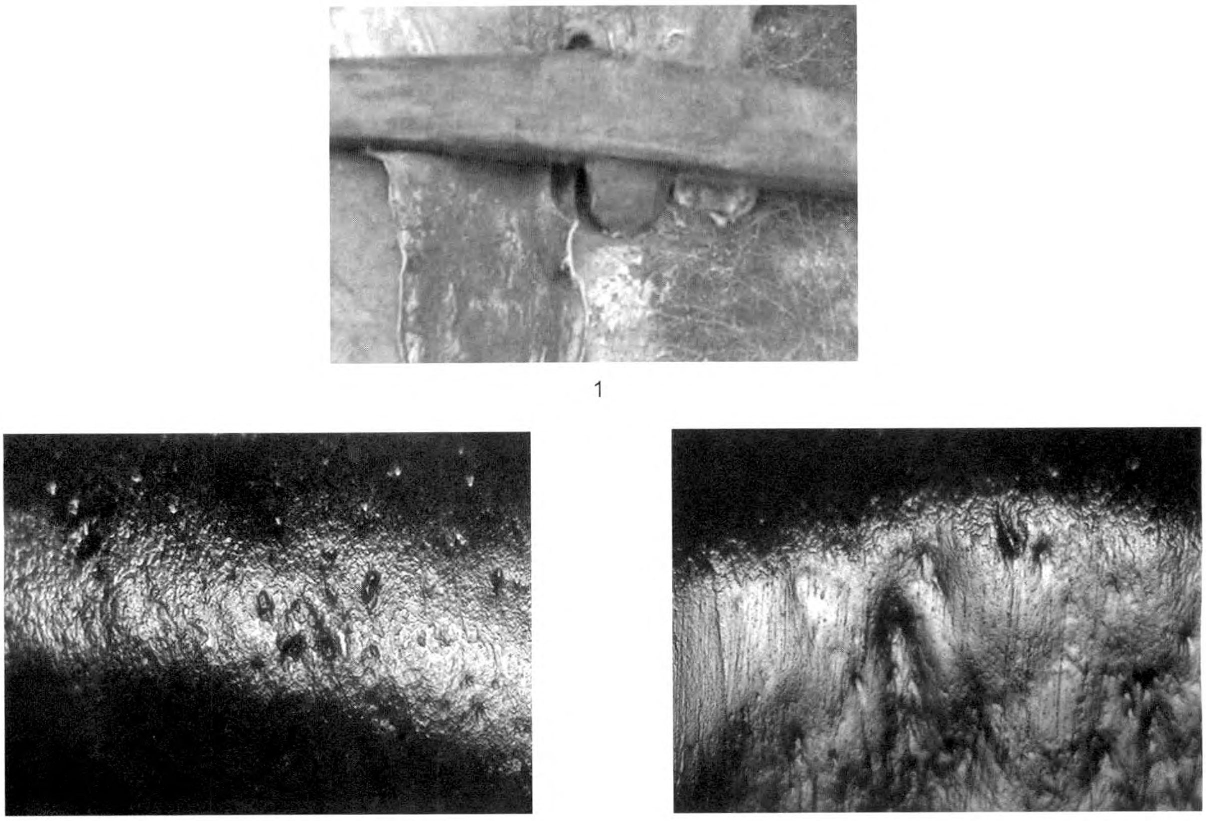
Interpretation of results from the Ui I site

Each of the three techniques of skin processing described above requires a specific set of tools and can be detected by use-wear traces left on the implements. Let's now consider materials from the site and try to use them for archaeological reconstruction.

Identification of the processing techniques. A set of implements associated with skin processing consists of end-scrapers with a convex working edge. Thus, the possibility of using the techniques practiced by the Salish has to be excluded, since their techniques are based on the application of tools with a straight working edge. The Athapaskan and Koryak techniques are based on the application of tools with convex edges.

The Athapaskan technique involves the usage of two kinds of tools with convex edges – with broad and narrow working edges. These tools have cranked handles. The character of the work depends on the position of the skin under procession and the type of the handle. On narrow tools, signs of use-wear are scattered along the edge, while on larger tools they are concentrated in the middle part of the working edge.

The Koryak technique is also based on the application of tools with convex working edges of two kinds – broad and narrow. The way the blade is attached to the handle and the character of performed movements condition



1

2

3

Fig. 5. Tool position (*1*) and use-wear patterns (*2, 3*) in dry skin scraping.

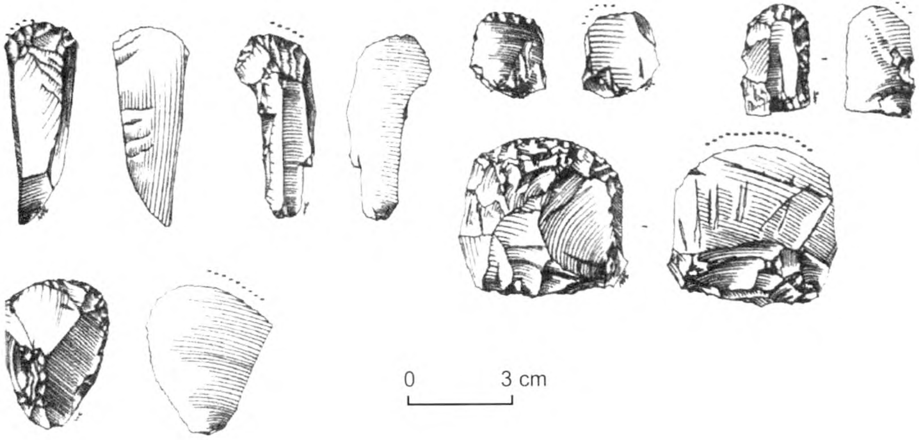


Fig. 6. End-scrapers from the Ui I site.

the location of use-wear signs on both the working edges and the surface of the tool.

The materials collected from the Ui I site have shown that two kinds of end-scrapers – narrow elongate and wide short – were used (Fig. 6). They correspond to two use-wear patterns displayed by the tools' working edges. On narrow elongate tools, use-wear signs are dispersed along the edge, which attests to the use of cranked handles. Thus, it can be assumed that the Athapaskan technique of skin processing was used in this case. Wider end-scrapers demonstrate use-wear traces concentrated in the middle part of the workings edge very close to the margin; only

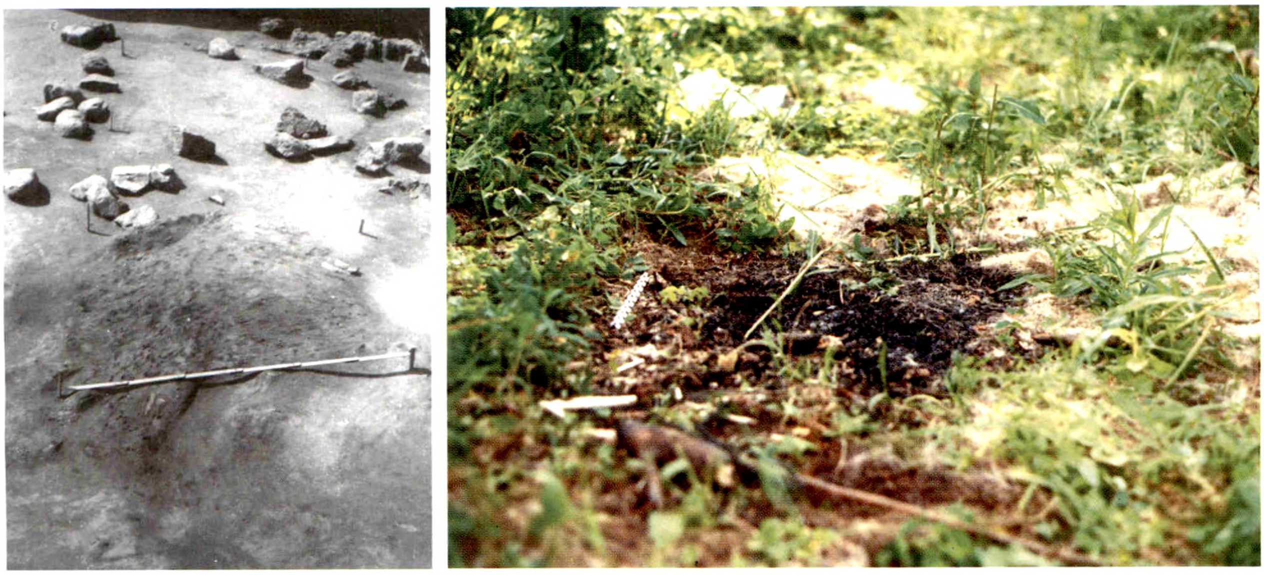


Fig. 7. Oval ash spot in the culture-bearing layer of the Ui I site (*1*) and oval ash traces left on the ground after autumn skin drying (*2*) (Canada).

a few traces occur on the tools' lower portion. The angle between the tool and the processed surface was obtuse, which makes it possible to exclude the technique the Koryak used. The two above-mentioned classes of tools could have been used at different stages of processing the skin lying on a wooden stand: the narrow tools were used for scraping medium-sized skins (for example, of a reindeer or roe deer), while the wide ones were used for skin softening.

It should be noted that the first stage of processing – skinning – is not represented in the materials of the sites. Bone implements appropriate for this stage are absent. It can be assumed that stone tools were used for these purposes, but the studied stone artifacts do not demonstrate either evidence of working on fresh skin, or traces of strokes that inevitably appear at this stage.

Interpretation of the features discovered in the culture-bearing layer. It is likely that an oval structure from animal ribs was used for stretching the skins while they were drying before consecutive stages of processing. The size of the structure (1.5 × 0.85 m) is suggestive of the fact that skins of medium-sized animals (reindeer or roe deer) were dressed.

Charcoal spots could represent traces of fire made for skin drying and its initial softening, probably in autumn (Fig. 7). This reconstruction is undoubtedly hypothetical, since only micromorphological research can clarify the character of fire and the type of fuel used.

It can thus be assumed that we deal with a site that was inhabited in autumn, in the season of big hunting. Here preliminary skin processing took place followed by further processing and storage, although some of the skins were tanned on the spot. The absence of tools for skinning seems to be puzzling. There are no traces of fires for skin smoking either, though this procedure could take place somewhere at the site with no special fires made for this purpose.

Conclusion

The method employed here made it possible to reconstruct the nature of production processes practiced by the inhabitants of the prehistoric site. Like many other research methods, the potentials of ethnoarchaeology are quite limited due to the incompleteness of initial materials. The initial data collection in the field has to be oriented towards obtaining samples for detailed laboratory study. Even if this is the case, the ethnoarchaeological approach in itself cannot serve as a means for receiving unambiguous reconstructions. Rather, this method reduces the number of tentative hypothesis to a minimum and suggests several possible solutions.

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DISCUSSION

THE ISSUE OF THE MIDDLE TO UPPER PALEOLITHIC TRANSITION

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MIDDLE PALEOLITHIC STUDIES ON THE KOREAN PENINSULA

Introduction

It is generally acknowledged that the most important criteria in the identification of Middle Paleolithic cultures in Northeast Asia are based on studies of the Levallois technique. Levallois cores and flakes are reported from Korea, points on flakes have been found in China, and *shaziki* points have been recovered from sites in Japan. Researchers have defined the time from 100 to 40 ka ago as the period corresponding to the classical age estimates of the Middle Paleolithic in Europe and attributed all Asian sites of the corresponding time span to the Middle Paleolithic. Naturally, at early stages of investigations, specialists working in the territories in question could not find reliable criteria for the identification of Middle Paleolithic cultures, so they often used comparisons of Korean artifacts with evidence obtained elsewhere.

Let us begin by stating those characteristic features that have been currently established for Middle Paleolithic cultures. Western scholars have been studying the Middle Paleolithic for a long period and have identified technologies specific to this period and its chronological brackets (e.g., Bordes, 1953; Wymer, 1984; Paleolit SSSR, 1984; Derevianko, Markin, Vasil'ev, 1994; Takebana Kazuo, 1999).

During the Middle Paleolithic, two techniques of stone working were developed: the Levallois technique, which was characterized by cores with prepared striking platforms, and the blade technique. Various types of blades appeared corresponding to Mode III in D. Clark's classification. F. Bordes classified lithic industry of that period into four distinct variants: Typical Mousterian, Denticulate Mousterian, Mousterian of the Quina type, and the Mousterian of Acheulian tradition, the latter including two evolutionary stages (A and B). The majority of the known Mousterian lithic industries may be attributed, at least in certain features, to one of these variants. The Levallois technique is distributed over a vast territory from Europe to the Near East, Siberia, Central Asia, northwestern Mongolia, and North Africa, and is regarded as the leading technique in the production of stone tools during that period.

The appearance of the Levallois technique is commonly attributed to the period of roughly 100 ka ago, beginning with the latest glacial period and lasting until approximately 40 ka ago. According to the analysis of oxygen isotopes $^{16}O/^{18}O$, this period corresponds to stages 3 to 5 of the SPECMAR oxygen-isotope curve. Archaeological materials dating from 300 ka ago and later are generally attributed to the Mousterian. The upper chronological limit of existence of such technocomplexes has not yet been defined. The technical ability to produce longer blades led to the transformation of Levallois technology into the technology of blade-knife production characteristic of the Upper Paleolithic.

Researchers reported certain collections from France demonstrating local specific features of the Middle Paleolithic. For instance, industries of the Ferrasie type and those belonging to the Acheulian tradition contain only very few artifacts showing traces of retouch. Certain sites have been reported whose materials did not contain any specimens demonstrating Levallois technology (Wymer, 1984; Tattersall, Delson, Couvering, 1988). Sites producing Levallois-based collections are dispersed over a vast territory; at the same time, there are many regions yielding specific variants of Middle Paleolithic culture*.

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* The Altmuhian lithic culture from southern Germany may be regarded as an example of this statement This culture is characterized by willow-leaf points. The Micoquian technocomplex from Central and West Europe yielded handaxes with short, pointed tips. Age estimates of the Indian Middle Paleolithic have not been established yet; however, its technological features differ from those of European cultures. African lithic industries evolved in an approximately similar way to European and West Asian industries, yet African collections have provided evidence of various traditions, i e., the tradition of Aterian stemmed points from the northwestern Africa, the Lupemban tradition from central Africa, etc, available evidence also suggests a considerably early appearance of the technology of blade-knife production (Tattersall, Delson, Couvering, 1988. 341 – 344)

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Some researchers find certain features in the Middle Paleolithic of Northeast Asia similar to Mousterian lithic industries in Europe. This point of view seems to be a result of the inadequate state of Middle Paleolithic studies in the region. Apparently, European standards for Middle Paleolithic attribution do not work everywhere. For instance, the Chinese Middle Paleolithic does not conform to European theoretical standards. Many researchers agree with this statement, starting with Pei Wenzhong and Jia Lanpo, the founders of Chinese Paleolithic archaeology, and also includes many contemporary students of the Middle Paleolithic. Many researchers believe that Chinese Middle Paleolithic culture should be identified on the basis of faunal and anthropological remains as well as on the basis of the analysis of Quaternary geological deposits (Zhang, 1980: 8; Wei, Xie, 1989). Wei Qi, who started his career as a geographer, argued that Chinese Paleolithic chronology should be re-established on the basis of available geochronological data.

Thus, it is understandable that a general point of view on the Northeast Asian Middle Paleolithic should be reviewed. It is necessary to re-interpret the available evidence on the Korean Middle Paleolithic and to work out clear distinctive features of this period as a whole.

Geological features and new absolute chronological data

Currently, Korean scholars have established chronological boundaries for local Middle Paleolithic industries on the basis of data drawn from Quaternary geology, because archaeological criteria for Korean early prehistory have not yet been elaborated. A so-called pebble tool tradition was widely distributed over the Korean Peninsula. It is rather difficult to find the roots of this tradition and to identify its distinctive features, as local variants possessed certain morphological features of previous periods. It is natural that chronological estimates of the Middle Paleolithic have long been based on various data. In some cases, they were based on cross-dates established for those European sites that were attributed to the Middle Paleolithic. In other cases, earlier culture bearing horizons were considered as Early or Middle Paleolithic on the grounds of relative geochronology. More recently, with the beginning of discussions on cryogenic structures and interpreting of origin and age of river terrace sediments on the basis of correlations of the results of oxygen-isotope analysis, a comparatively detailed chronological system has been established. In the course of studies of terrace formation, deposits and cryogenic disturbances and correlation with data from $^{16}O/^{18}O$ isotope analyses, the age of the sites yielding pebble industries has been estimated as no earlier than ca 125 ka ago. Despite the fact that the Korean Peninsula was included in the major permafrost zone, most of the sedimentary strata revealed well-preserved lenses.

Based on the results of the TL analysis of loess sediments at Khantkhan Lake that yielded many Paleolithic sites, the age of the Jeongokri site has been estimated in the range of 70 – 190 ka (Table 1). Jeongokri is a typical site for this region. It was well investigated and yielded a pebble industry. Its chronological estimates have long been debated. All the expressed opinions may be subdivided into three major viewpoints. One of these opinions belongs to Bae Gi Dong. He believed that basalt was effused around 300 ka ago. Taking into consideration basalt weathering and accumulation of culture-bearing sediments, the earliest period of human occupation may be estimated at ca 200 ka ago. He argued that a layer of red clay noted at this site was formed under warm climatic conditions and might be correlated with the red clay stratum at the Luochuan site in China. On the basis of these suppositions he estimated the age of Jeongokri as 180 – 200 ka (Bae G.D., 1989; Gumpari Site, 1999). The second viewpoint was expressed by Lee Seon Bok who had dated the site to 40 – 50 ka (Lee S.B., 1989). Recently he has changed his mind and claims an earlier date for the site (Lee S.B., 1996: 148 – 149), as he believes that the earliest sedimentation stratum had been accumulated over the basalt bedrock in the Imjin River basin about 130 – 75 ka ago (Yi, 1999). The author of this paper and Lee Dong Yong advocated the idea that cryogenic structure of the sediments attested to the fact that they had been accumulated under the cold climate. If one agrees that terrace formation processes occurred prior to human occupation of the site and the early limit of the date of the lowermost stratum corresponds to the Riss-Würm interglacial, then the site's age may be estimated at ca 125 ka (Lee D.Y., 1997). The most recent absolute dates corroborate this third hypothesis* (see Table 1).

In the course of investigations at the Yonggok site (Jeon J.H., Yoon J., Kim G.S., Ryu J.G., 1986), absolute dates have been generated for each stratigraphic layer bracketing the period of 46 – 111 ka. Uranium series analysis produced two dates for horizon 1: 71,000 ± 2000 yrs ago and 111,000 ± 1000 yrs ago; and two dates for horizon 2: 49,900 ± 2000 yrs ago and 46,100 ± 2000 yrs

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* The author of this paper has no doubts regarding the reliability of the date generated for the second terrace as well as in the statement that a frost vein in the layer overlying the second terrace appeared later than 125 ka due to climatic change. Two strata were identified in the filling of this vein Preliminary age estimates of these strata by the oxygen isotope method produced two dates: the lower stratum is dated to OI stage 4 (73,910 – 58,960 years), and the upper stratum is dated to OI stage 2 (24,110 – 12,050 years) (Lee H J., 1998b). However, this topic needs additional investigation.

Table 1. Absolute dates generated for Middle Paleolithic layers

Site	Absolute date, years BP	Dating method	Stratigraphic layer	Reference
Jangpari Gawolri Juwolri Yangmunri	73,800 ± 14,000 190,000 ± 24,000 116,000 ± 7300 72,500 ± 6200	TL	Upper portion of a silt layer Silt at the bottom of trench A Idem The upper portion of marsh sediments	(Lee S B, 1996)
Jeongokri	46,050 ± 5430 48,200 ± 6690	»	Silt from riverine sediments Idem	(Lee S B , 1989)
Yeongok Cave	49,900 ± 2000 46,100 ± 2000	^{230}Th/^{234}U	Cultural horizon 2	(Han C G, 1997)
	71;000 ± 2000 111,000 ± 1000	^{230}Th/^{234}U TL	Cultural horizon 1	
Bogmeondong	49,860 ± 2710 48,450 ± 1370	^{14}C	Lower stratum	(Lee Y J , Hong M Y , 1999)
Noeundong	> 54,720	»	Horizon 7	(Han C G , 2000)

ago. Archaeologists from North Korea have argued that horizons 1 and 2 (buried soil layers 8 and 9) containing archaeological remains were accumulated during the middle Upper Pleistocene (Q_{3-2}) (Kim G.S., 1991; Han C.G., 1997). Recent investigations at the Bogmeondong and Noeun-dong sites produced a radiocarbon date of around 50,000 yrs (Lee Y.J., Hong M.Y., 1999; Han C.G., 1999). The lithic industries of these sites are based on the pebble tradition.

Currently, Korean scholars as well as their Japanese colleagues have focused their efforts on investigations of sediments of volcanic origin (Choi S.R., Sakada, 1995; Lee S.B., 1996, 2000; Park Y.C., Kim J.Y., Yang D.Y., Seo Y.N., 2000). This research has scientific value, although it has not yet revealed the mineralogical composition of the sediments*. The soil and sediments at the Goreri site yielded samples of an amorphous glass-like substance that has been identified as a crystallized volcanic glass derived from acidic tuff, or as tephra. This fact enables researchers to hypothesize the local origin of tephra; it was formed as a result of volcanic rock disintegration (Park Y.C., Kim J.Y., Yang D.Y., Seo Y.N., 2000: 19 – 24). The analysis of volcanic ash samples has just begun and seems promising.

The earlier chronological border of the Korean Middle Paleolithic has not yet been established due to the scarcity of well-investigated Lower Paleolithic sites. However, considerable information is available for contiguous territories. For instance, the earlier chronological border of such technocomplexes at ca 200 ka has been established in China. Siberian sites, in the Altai in particular where one of the most important sites is Denisova Cave, have yielded dates around 300 ka (Derevianko, Markin, Vasil'ev, 1994; Derevianko et al., 1998; Problemy..., 1998).

More than 30 sites have been reported from China attributable to the Middle Paleolithic including Dali, Jinniushan, Xujiayao, Dingcun, Miaohoushan, Mapa, and Chaoxian, which are considered typical for that period. The earliest age estimates of 300 ka for these sites have been established on the basis of available absolute dates and the biostratigraphic correlation of faunal remains. However, this date does not contradict the chronological limits for the final Middle Pleistocene – early Upper Pleistocene. In other words, the majority of sites in China appeared after the Lushan – Dali interstadial. Most of the sites enumerated above yielded hominin fossil remains attributable to archaic *Homo*

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* Choi Son Rak and Sakada Kunio have mistaken silicon particles for tephra. Lee Seon Bok (1996: 153 – 157: 2000. 12 – 14) agreed with Japanese scholars on the possible occurrence of Aira-Tanzawa (AT) tephra sediments in Korea. However, he regarded all stratigraphic layers containing AT tephra as penecontemporaneous with the Aira-Tanzawa tephra itself, a conclusion with which the author cannot agree T. Soda (Yi S B, Soda T., Arai F., 1998) argues that upon concretion, tephra particles disperse over a considerable area and do not form a solid layer. The concentration of tephra decreases in the overlying layers and small amounts of tephra may be found in the underlying strata as well. Apparently, sediments containing AT particles do not correlate with the time when the AT was formed. Recently, Asada has traced AT volcanic ash particles not only in the sediments of Jeongokri, Gawolri, and Juwolri sites, but also at Noeun-dong, Jungnaeri, Jangnyunri, Goreri, and other localities

sapiens (Wei, Huang, Qi, 1999; Qi, 1989; Gao, 1999)*. Chinese researchers infer on the basis of their analysis of available lithic collections that archaic *Homo sapiens* represented the bulk of the Middle Paleolithic human population.

It is generally believed that the characteristic features of Middle Paleolithic industries reported from Northeast Asia gradually changed during the final Middle and Initial Upper Paleolithic. At the first stage of these investigations, there was a strong tendency towards adaptation of European chronological estimates to Asian materials because of the scarcity of complex investigations in Northeast Asia. This fact seems to be the reason why scholars were not able to state the clear difference between European and Northeast Asian cultures. There are examples when the desire to avoid Eurocentric concepts led to exaggeration of local specificity of archaeological materials, while a thorough analysis of cultural features has not been carried out. As a result, a coherent definition of the Asian Middle Paleolithic has been left for future investigations (Gao, 1999).

At present, the most urgent tasks are to establish a reliable chronology of the Korean Middle Paleolithic on the basis of scientific data, to trace the relationships of the Korean Middle Paleolithic industry, and to identify its specific features. An apparent scarcity of available materials encourages us to carry out preliminary investigations in these fields.

Diversity of variants of Middle Paleolithic culture

Only a few sites located on the Korean peninsula have been investigated through continuous excavation of their Middle Paleolithic cultural layer. That is the reason for the present scarcity of available archaeological materials. Hence, the author rests this analysis on materials recovered from those sites that have yielded principal categories of artifacts. Sites yielding pebble industries may be attributed to the Middle Paleolithic. However, this industry might have persisted until the Upper Paleolithic (Lee H.J., 1997, 1998). This paper is focused on discussions of those archaeological sites that yielded Middle Paleolithic artifacts from the lowermost portion of the upper ice vein, and those whose Middle Paleolithic attribution is substantiated by available absolute dates. The list of such sites includes Jeongokri (Jeongokri site, 1983; Bae G.B., 1989, Bae G.B., Go J.W., 1993; Bae B.D. et al., 1996), Gumpari (Gumpari site, 1999), Gawolri, Juwolri (Lee S.B., Lee G.D., 1993), Sanmuryungri (stratum IV) (Choi B.K., 1989), Gumgul (Sohn B.K., 1985), Yeongok (stratum 9) (Jeon J.H. et al., 1986), Suyanggae (stratum 5) (Lee Y.J., 1985), Balhandong (Excavation Report of Balhandong, 1996), the lowermost horizon at Gokchon (stratum 7) (Lee Y.J., Woo J.Y., 1999), and Seokjangri (strata 8 – 10) (Sohn B.K., 1993)*, Jungnaeri (Lee G.K. et al., 2000), Jangnyunri (Lee H.J., 2000a), etc. (Fig. 1). The Namgaeri (stratum 4) (Excavation report of Namgaeri…, 1991; Choi M.J, 1994), Yongtandong (Lee S.B., Lee K.D. 1993), Byungsanri (Han C.G., 1996), and Sorori (Lee Y.J., Woo J.Y., 2000) sites are also attributable to the Middle Paleolithic, definitely or possibly, though due to the fragmented character of available materials they were not included in the present study. The sites of Bogmeondong and Noeun-dong are not been considered important since only typological materials were described in reports on their investigations, leading to their exclusion from the present study. The latter sites are characterized by recurring tool types, because the tools were produced on flint pebbles through pebble reduction technology.

Specific features in the primary stone reduction

In the course of analysis of primary reduction strategy noted at the above-mentioned sites, certain specific characteristic features have been noted. First of all, we must consider cores with partially prepared striking platforms. These cores were intentionally prepared for detaching numerous spalls. Specimens from which disc-shaped and amorphous blanks were detached constitute a large category as well as those from which large flakes were removed from a natural platform. Judging from the morphology of polyhedrons and comparing them to choppers and chopping tools, many may also be regarded as cores. Changes in the technology of tool production were considerable as the reduction strategy was aimed at the production of flakes whose edges were consequently retouched. Occurrences of large blades, more than 5 cm in length with some specimens exceeding 10 cm, suggest that tools fashioned on such blades varied considerably in size. Large, or massive, tools were produced on flakes rather than on whole

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* Human fossils recovered from the sites of Jinniushan and Miaohoushan have been attributed to early *Homo sapiens*. Their chronometric estimates suggest Lower Paleolithic attribution. The Guanyindong site produced Middle Paleolithic chronometric estimates, although some researchers attribute this site to the Lower Paleolithic.

* Sohn himself used another designation for cultural horizons identified in the course of his excavations. The stratigraphic situation at the site has been reported in different ways by scholars participating in those investigations. In the present paper, designations are provided following the work of Jeong (Jeong Y.H , 1997)

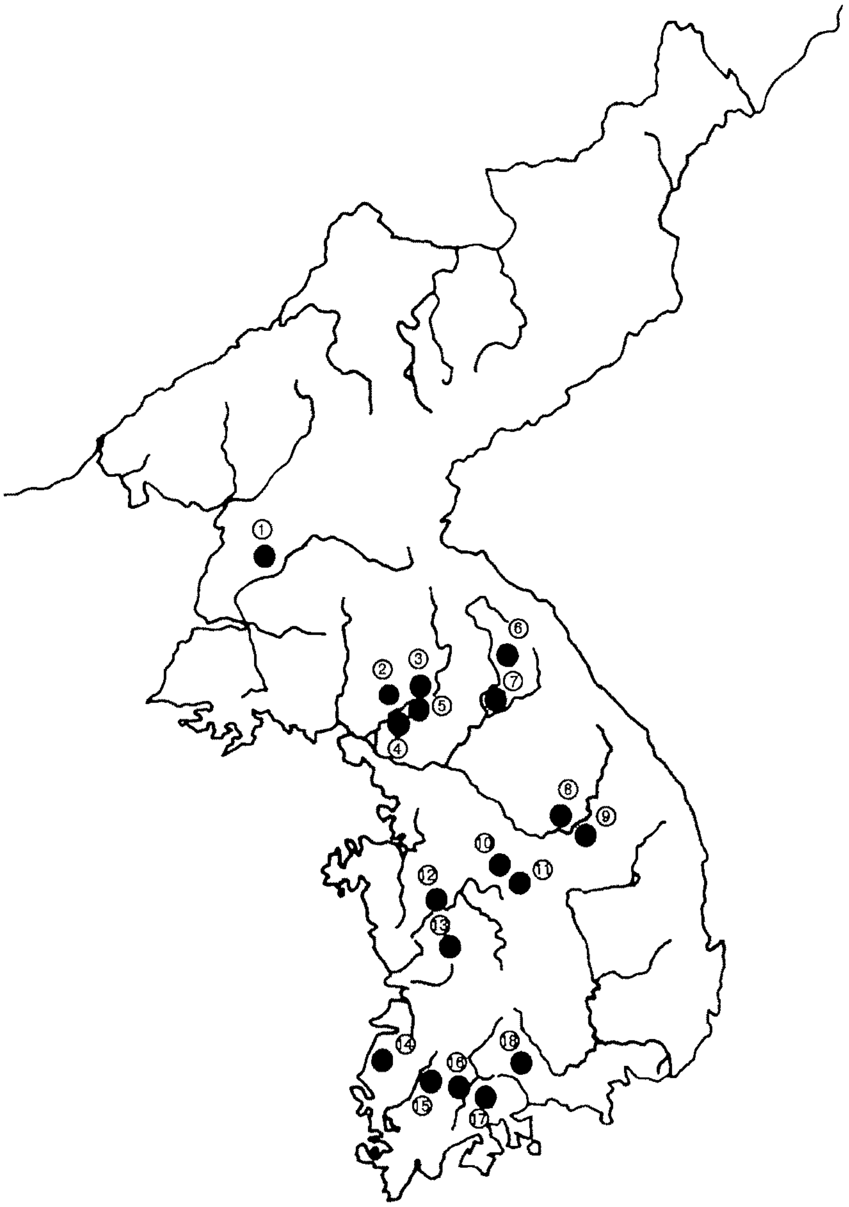

Fig. 1. Map showing the location of the major Paleolithic sites on the Korean Peninsula.
1 – Yonggok Cave, *2* – Namgaeri; *3* – Jeongokri; *4* – Gumpari, *5* – Gawolri and Juwolri, *6* – Sanmuryungri; *7* – Byungsanri, *8* – Suyanggae, 9 – Kingul; *10* – Bogmeondong, *11* – Sorori, *12* – Seokjangri, *13* – Yonghodong, *14* – Jangnyunri, *15* – Danga, *16* – Daejon, *17* – Gokchon, *18* – Juknaeri

cobbles. For instance, the Jungnaeri and Jangnyunri collections comprise numerous blades made on andesite, tuff, and other raw materials; a considerable number of these blades represents large specimens and tools made on large blades.

The lamellar technique tended to develop in various ways. Different sites have produced different numbers of blades, which may be the result of incomplete excavations at certain sites, or the functional specificity of the site in question – it may be a workshop or a temporary camp, or else certain geological factors exerted an impact on the preservation of the sites' culture-bearing horizons.

Stone tools types

As was stated above, currently the array of geological data and absolute dates generated for strata bearing Middle Paleolithic cultural remains has been enlarged. Still, the information is not sufficient for carrying out chronological correlations between separate collections. Only a few multilayered stratified sites, like Seokjangri, have been investigated. Chronological estimates have been based on noted major technological features. The comprehensive study of categories of artifacts recovered from Korean Paleolithic sites yields several specific characteristic features. Archaeological collections originating from different sites comprise local specific specimens (Table 2). Three technical-typological variants may be established within the Korean Middle Paleolithic *.

The first variant of the industry includes handaxes, the tools typical of the Korean Middle Paleolithic (Fig 2, 3). This tool type has been reported from Jeongokri, Gumpari, Gumgul, and other sites located mostly in the central and northern parts of the peninsula. Also, handaxes have been reported from surface collections at such sites as Byungsanri, Gawolri, and Juwolri. Handaxes have been also recovered from sites in southern Jeolla Province. Thus we may assume that this tool type was distributed all over the Korean Peninsula. In Korea, technological features of the collections indicating handaxe production were formed on the basis of a bifacial tradition, and in some cases on the basis of a unifacial tradition. Points, picks, and other tool types may also be included in the group of lithic tools manufactured within the tradition of bifacial tool production. Some scholars trace the features of handaxe manufacturing as early as the end of the Early Paleolithic. They do agree on the exact stage of Lower Paleolithic. As has been already mentioned, signs of the handaxe tradition are widely recognizable within the Middle Paleolithic industries of Korea and China. Among other major lithic types, tools made on flakes constitute one of the most numerous categories. A category of handaxes on flakes also includes many specimens (Lee S.B., Lee G.D., 1993a, b; Yoo Y.U., 1997; Gumpari Site, 1999) (see Fig. 2, *1, 3*; 4) The collection of handaxes includes specimens of Acheulian type, fashioned as bifaces. However, the archaeological collections from Sanmuryungri, Balhandong, and Durubon Cave yielded a variety of amorphous handaxes manufactured within a tradition of unifacial tool production, as well as small handaxes and points (see Fig 3). The wide distribution of lithic industries based on the tradition of handaxe production throughout the peninsula represents one of the most important features of the Korean Middle Paleolithic.

The second variant is represented by a pebble tool tradition based on chopper/chopping tools and polyhedrons without handaxes (see Fig. 2, *5 – 8*; 5). A series of typical sites representing the tradition in question includes the cave sites of Yeongok-1 (horizons 8 – 10) and Yeongok-2 (horizon 8), the open-air sites of Gokchon (area 3, horizon VII), Seokjangri (horizon 10, horizon of pebble chopping tools), and Sorori. The majority of these sites, with the exclusion of Yeongok Cave, were discovered through the excavation of test pits in the course of investigating Late Paleolithic sites. Recent reconnaissance work on the peninsular mainland and island territories of south Jeolla Province has shown the presence of pebble tools at many sites (Lee G.K., 1997; Lee H.J., 1997a, 1998a), specifically, collections that are dominated by chopper/chopping tools and polyhedrons. It is universally assumed that most of the Middle Paleolithic sites in Korea demonstrate assemblages associated with the pebble tool tradition.

The third variant of Middle Paleolithic industry comprises tools fashioned on flakes, including handaxes, and shows secondary working with fine retouch (Fig. 6, 7). Such collections are characterized by the choice of raw material; that is, rocks that can be modified with fine retouch. Among recently investigated sites, Jungnaeri and Jangnyunri belong to this third Middle Paleolithic variant. Flakes of tuff, andesite, and schist were used for tool production, most of them having been retouched. The Jangnyunri site produced cores, blanks, tools similar to handaxes, cleavers on large flakes, retouched blades, lateral and end-scrapers, notched tools, retouched tools, etc. Tools on flakes of different types of raw material exhibiting fine retouch were also identified. A similar tool kit has been recovered from the Seokjangri site. As is recorded in the site's excavation report, the Middle Paleolithic culture-bearing horizon includes (from bottom to top) a layer yielding tools on flakes, a layer containing points and end-scrapers, a layer of pebble chopping tools, and a layer of lateral scrapers and points predominantly made on porphyry (Sohn B.K., 1968, 1972, 1993). The following

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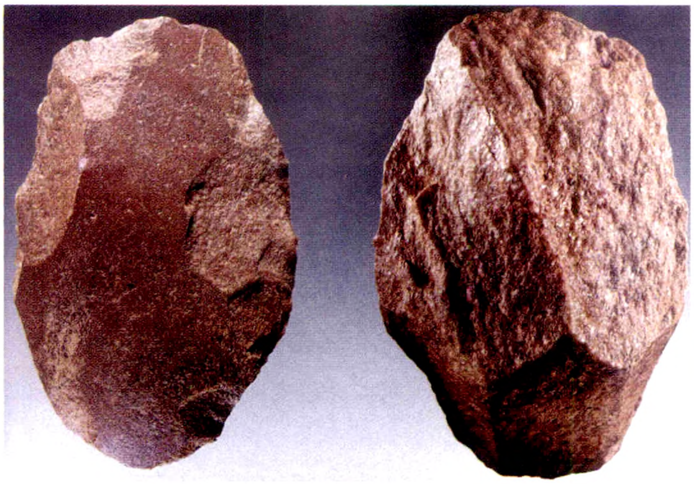
* Jeong Y.H. (1986) argued that the Korean Middle Paleolithic is characterized by large lithic tools, such as handaxes, choppers and chopping tools, picks, etc. He also assumed the existence of Levallois technology, though he stressed a predominance of tools made on flakes. Park Y.C (1992) identified a culture of pebble chopping tools (e.g., Yonggok, Cave I, horizons 8 – 10, Cave II, horizon 8, Seokjangri, horizon 10, horizon of pebble chopping tools; Gokchon area 3, horizon VII), and a culture following a tradition of polyhedrons, numerous chopping tools, and tools on flakes (e.g., Sanmuryungri, Gumgul Cave, Moenori, etc) Bae G.D. (1997) argued that the Levallois technique did not play an important role in East Asia. Archaic industries were reported from many regions along with an increase in the number of small tools. He stressed that the tradition of handaxes did not evolve, while the tradition of small tool manufacture produced only few tools exhibiting precise secondary treatment, many of which are hardly distinguishable from Early Paleolithic specimens. Lee S.B., in his latest work (2000), states that horizons yielding handaxes occurred within the lower stratigraphic layers that were attributed to stage 2 of the ^{16}O/^{18}O oxygen isotopic scale. On the basis of these inferences, he hypothesized three major stages of development of Paleolithic industries at open-air sites lithic tools production including handaxes; lithic tool production excluding handaxes; and small lithic tool production, including microlithic tools. However, it contradicts his opinion that "manufacturing of lithic tools of the Acheulian type continued until 20 ka ago" (Lee S.B., 1996. 156).

Table 2. Major tool categories in the Middle Paleolithic of Korea

Sites	Tool types																		Raw material
	Chopping tools	Polyhedrons	Handaxes	Retouched points	Cleavers	Picks	Chisel-like tools	Adzes	*Racloirs*	End-scrapers	Lateral grattoirs	Notched tools	Points	Burins	Borers	"Spurs"	Knife-like tools	Denticulate tools	
Jeongokri	+	+	+	+	+	+	+		+	+	+	+	+	+		+	+	+	Quartzite
Gawolri Juwolri	+					+			+		+	+							»
Geumpari	+	+	+	+	+	+			+		+							+	»
Sanmuryungri	+	+	+	+			+	+		+	+	+					+	+	»
Gumgul	+		+			+	+			+	+	+					+	+	»
Yeongok	+	+									+							+	»
Suyanggae	ǀ			+			+				+								»
Balhandong	+	+		+						+	+				+				»
Gokchon	+	+		+									+						»
Seokjangri-8	+		+	+			+			+					+		+	+	Porphyry
Seokjangri-9	+		+	+						+	+			+	+		+		»
Seokjangri-10	+		+	+						+	+			+	+		+		»
Jungnaeri			+		+						+	+						+	Tuff, quartzite
Jangnyunri			+		+				+		+	+							Andesite, schist



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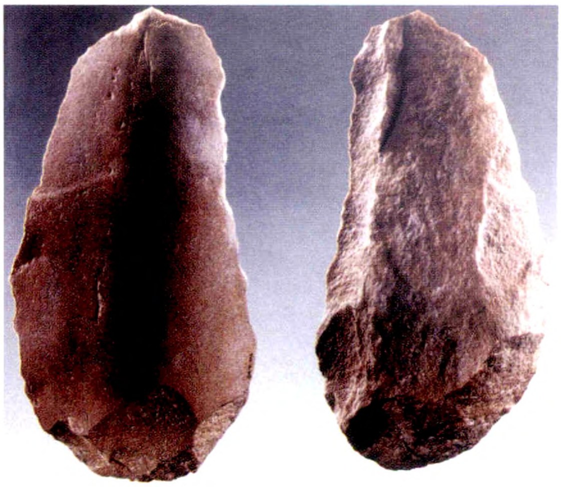

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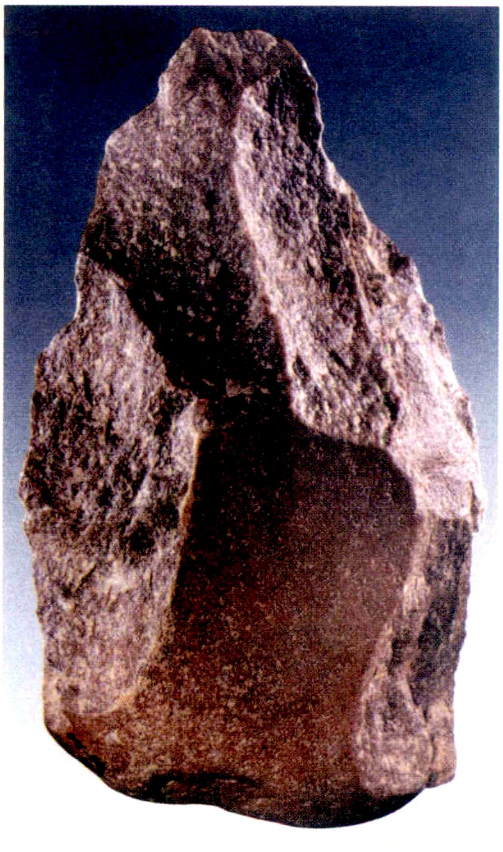

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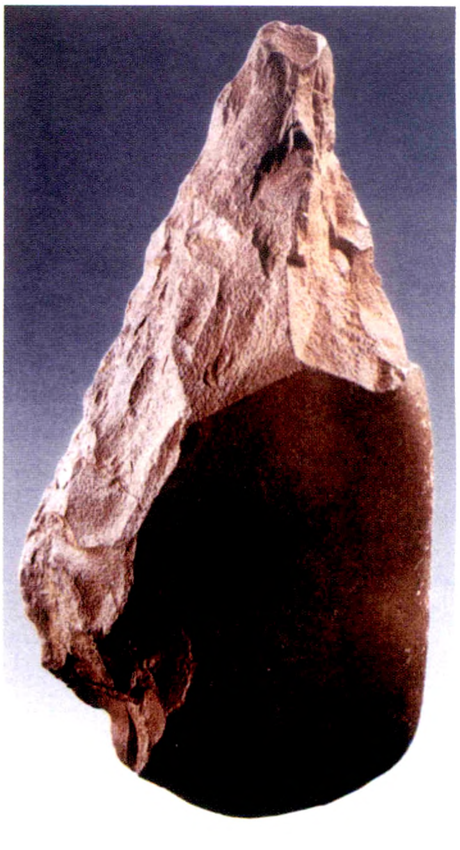

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specific features were identified for all these layers: the presence of cores, amorphous handaxes, and thoroughly retouched tools fashioned on flakes of various sizes.

The variety of lithic industries cannot be regarded as a result of independent technological decisions. Not all sites yield all three distinct tool types. Some sites yield cores, choppers, and chopping tools in association with handaxes; handaxes were identified within the tools fashioned on flakes with fine retouch; and chopping tools and polyhedrons occurred together with tools on flakes with fine retouch (see Fig. 7, 8)*. In order to understand

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* Such sites as Jeongokri, Gumpari, Jangnyunri, Jungnaeri, and Seokjangri yielded large tools fashioned on retouched

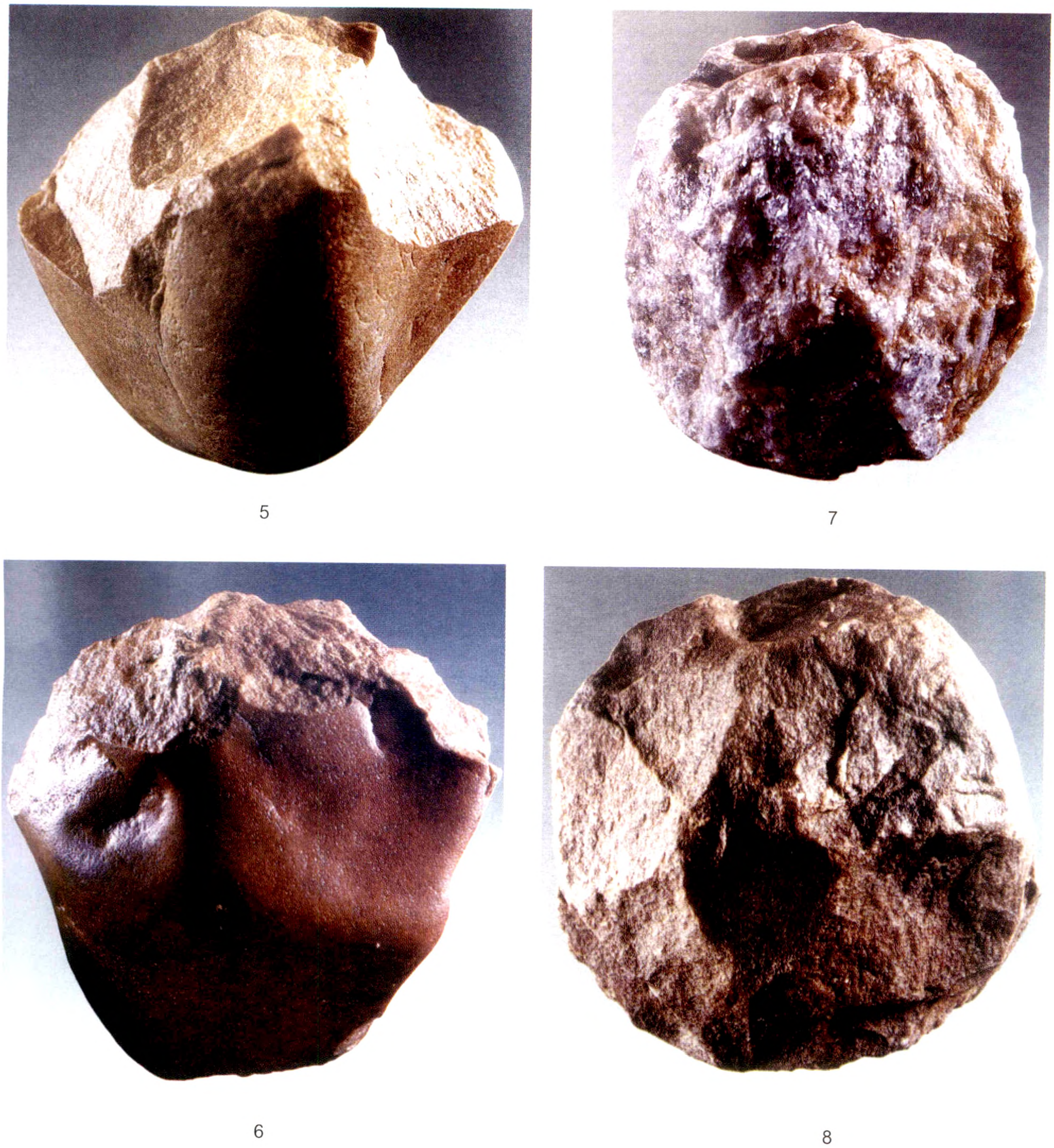

Fig. 2. Middle Paleolithic tools.
1 – 3, 5 – from Gumpari; *4* – Byongsanri; *6* – Sorori; *7* – Sangmuryongri; *8* – Bogmeondong.

the reasons for the appearance of three variants of Middle Paleolithic industries, it is necessary to draw attention to the strategy of lithic tool production as well as to raw material choice and cultural characteristics of the sites. One should also bear in mind that during the Middle Paleolithic in Korea, which brackets a considerable time period, there were artisans able to produce handaxes, though not all members of the Middle Paleolithic population chose to use this type of implement.

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flakes: e.g., cleavers, *racloirs*, and others. The artifacts collected from the surface at Gawolri and Juwolri as well as Jeongokri include handaxes and *racloirs* designated as knife-like tools fashioned on large flakes with bifacial retouch.

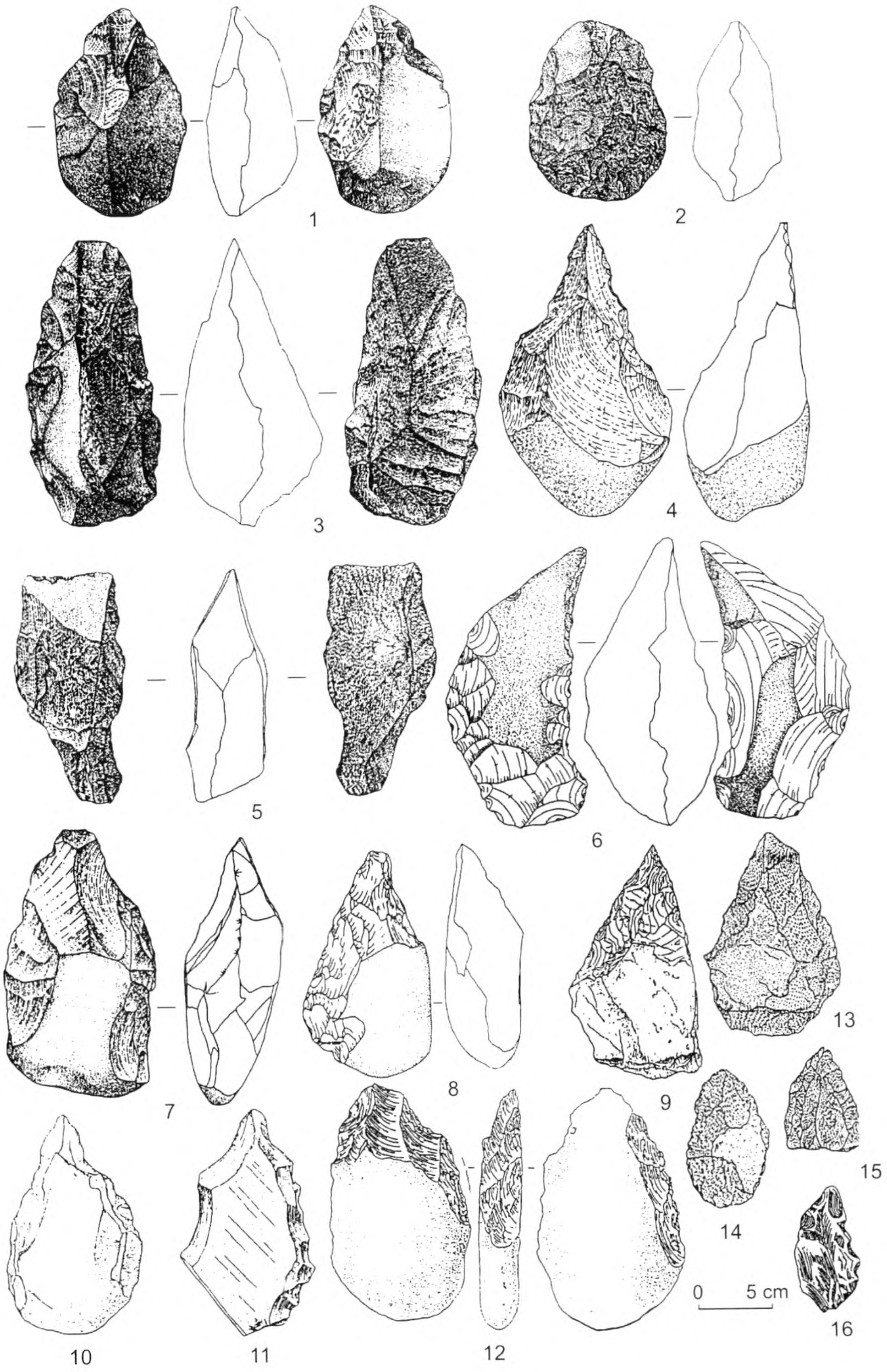

Fig. 3. Handaxes (*1 – 4, 6 – 16*) and a cleaver (*5*).
1 – 6 – Jeongokri, *7* – Gumpari; *8* – Byongsanri; *9* – Balhandong; *10, 11* – Kmgul; *12* – Daejon; *13 – 15* – Seokjangri; *16* – Yonggok Cave.

In Korea, unlike contiguous regions of Northeast Asia, the Middle Paleolithic tool kit is manifold. It includes products of a pebble industry like ovoid and triangular handaxes, points, picks, and other large tools as well as the products of blade technology, such as fashioning tools on flakes with fine retouch. It is noteworthy that the margins of tools on flakes have been treated not only with coarse but also with fine retouch*. In Korea, with the beginning of the Late Paleolithic, the tradition of manufacturing tools on flakes persisted from the preceding period (Lee H.J., 1997b, 1999).

Thus, three technologies of lithic tool production seem to have been developed in the Korean peninsula. Their major types included: pebble complexes including handaxes; pebble industries based on chopper/chopping tools and polyhedrons, and collections of lithic artifacts including numerous implements made on large flakes. However, in all probability, these industrial variants have proven themselves similarly at all sites in all regions. Such a variety of types likely represent the most specific feature of Middle Paleolithic cultures on the Korean Peninsula.

Characteristics of the Middle Paleolithic cultures of Korea's contiguous regions

The definition of what constitutes Middle Paleolithic culture in Northeast Asia is a crucial task for contemporary archaeology. According to the critical opinion of Gao Xing (1999), the series of investigated sites and the total number of lithic artifacts and faunal remains that serve as a basis for a general description of the culture as a whole are insufficient to resolve particular questions. It is important to stress the paucity of Middle Paleolithic evidence from Korea as well as from China and Japan that hampers profound insights into the archaeology of earlier periods.

During the 1990s several works appeared attempting to establish chronological periods and definitions of Middle Paleolithic culture. Despite the fact that these attempts were stopped during their initial stages, they nonetheless set the stage for further such developments. The scantiness of available materials pertaining to the development of Paleolithic culture in China as well as a divergence of opinions regarding the Lower Paleolithic in Japan as well as the dominant point of view vis-à-vis the pebble industry as a feature of the Lower Paleolithic in Korea have impeded Stone Age studies in Northeast Asia. However, accumulation of data on biostratigraphy and absolute age estimates for Paleolithic sites in China, the results of analyses of volcanogenic sediments in Japan, and geomorphological, stratigraphic, and radiometric data in Korea have all paved the way for further investigations.

The Middle Paleolithic culture of Northeast Asia is thought to have developed in two major directions: the pebble tradition and that stressing tool manufacturing based on various flakes (Lee H.J., 2000). Attempts to identify the contemporaneity of industries based on the utilization of core tools and on flake-tools as well as the period during which diversification of a preceding

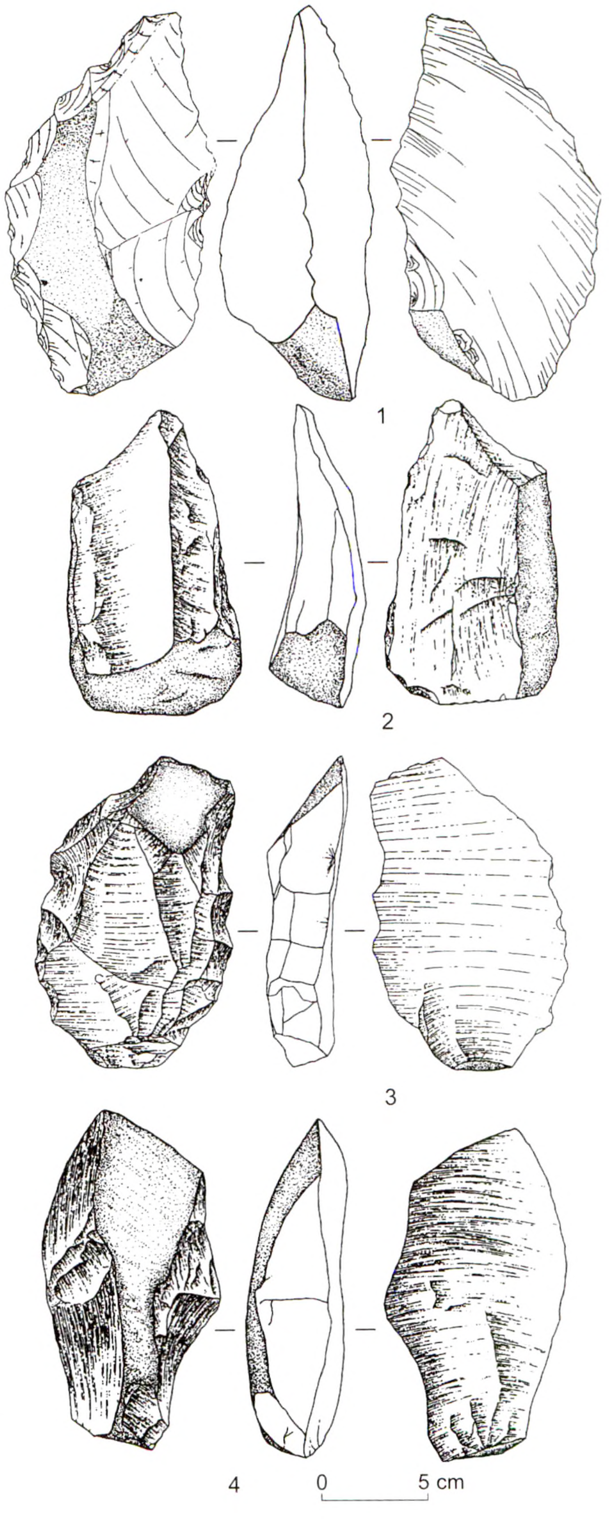

Fig. 4. "Pick" tools (*1*), handaxes (*2, 3*) and a cleaver made on a large flake (*4*).

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* Cultural level 3 at the Gumgul site yielded a considerable number of *racloirs* and, at the same time, the number of tools fashioned on flakes is greater that that of the tools made on chunks.

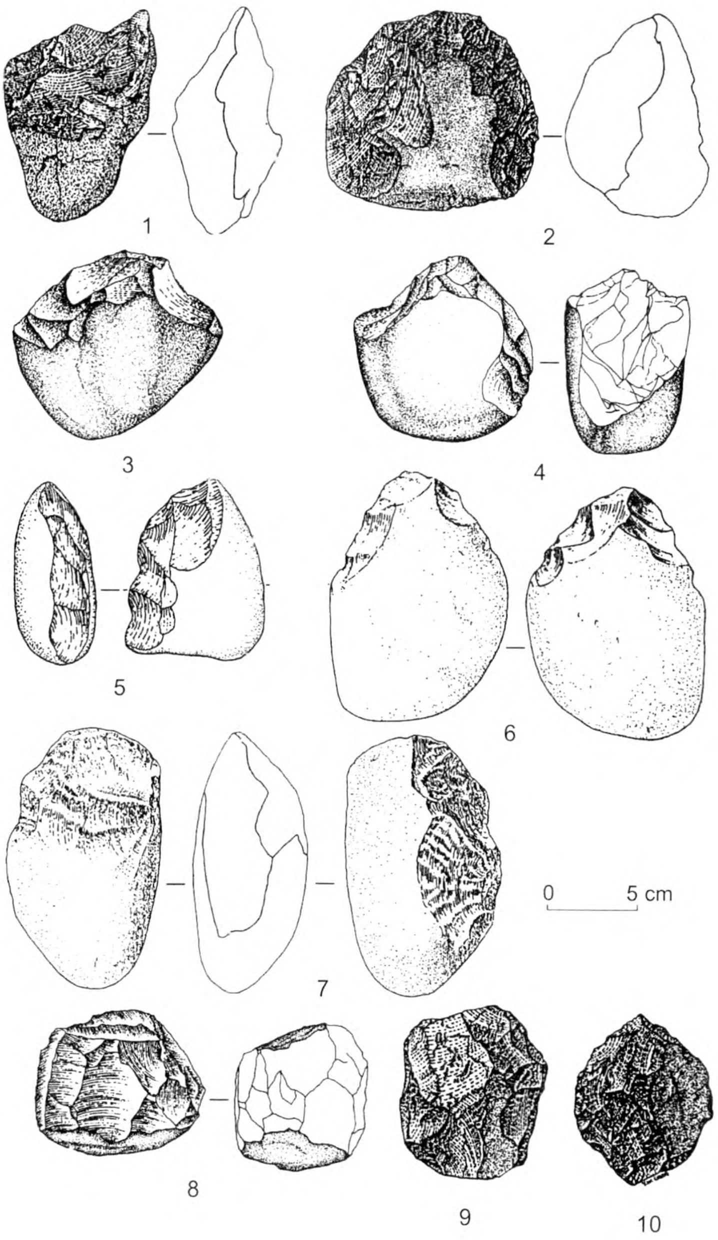
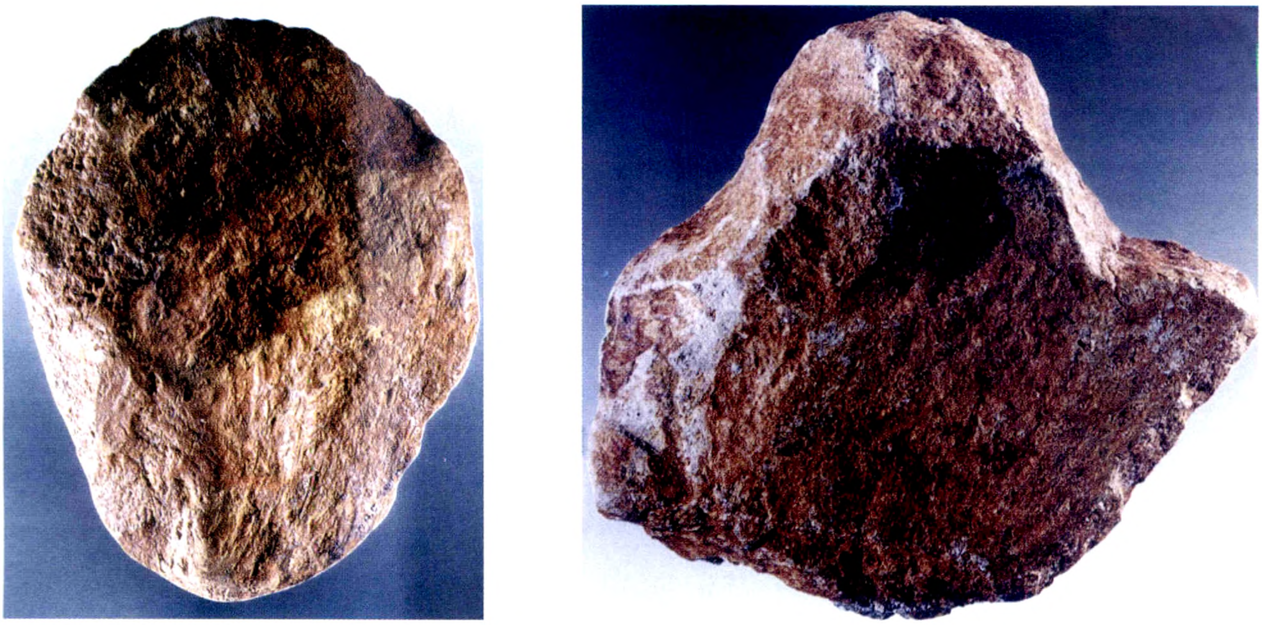


Fig. 5. Choppers (*1 – 3*), chopping tools (*4 – 7*), and polyhedrons (*9, 10*).

culture took place, have not produced reliable results at the present time in Northeast Asia. Even Lower Paleolithic industries demonstrate local specific features, strongly or feebly pronounced. Archaeological materials from Donggutuo in the Nihewan Basin of North China support this inference. The area of distribution of the flake-tool tradition seems to extend over broad territories of Northeast Asia, while the biface tradition was still practiced. Apparently, the diversification of flake tools was linked with changes in the ideas of human ancestors regarding lithic tool manufacturing. These changes may be illustrated by the modes of flake utilization: tools began to be made not only on small flakes but also on larger specimens; even such large implements as handaxes were fashioned on flakes.

The general features of lithic technocomplexes originating in Northeast Asia vary considerably from those noted in of Siberia, western Mongolia, and greater Central Asia, where the classical Levallois technique of stone knapping was widely used (Derevianko, 1999). Disc-cores are commonly reported from Korea, China, and Japan; such nuclei are regarded as residual products of a radial stone reduction strategy, and some researchers define them as Levallois cores. However, in Korea not



1 2

Fig. 6. Lithic tools from Jangnyunri site.
1 – handaxe, *2* – end-scraper.

a single site has yet been discovered yielding all components of the Levallois technique. That is why we can only hypothesize about the occurrence of the Levallois technique in Korea on the basis of a few identifiable cores and tools demonstrating occasional Levallois-like features.

Points currently described as Levallois products have been reported from the Chinese Paleolithic sites of Zhoukoudian (Locality 15), Zhangwu, Datong, and others. However, the combination of technical features that cumulatively define the Levallois technique has not yet been discovered, and researchers do not attempt to attribute points to the category of Levallois products (Zhang, 1980; Qiu, 1989; Xie, You, 1984).

The work of Japanese researchers on the definition of *shaziku* points also touches on the Levallois question. Some Japanese scholars believe that the industry based on disc-cores and *shaziku* blades detached from such cores, which were subsequently retouched into *shaziku* points, occurred not only in Japan but also in North China (e.g., Dingcun (Localities 54 and 100), Zhoukoudian (Locality 15), etc.). They propose a hypothetical explanation for the diffusion of this industry over the territory of North China and Japan (Sato Hiroyuki, 1998). *Shaziku* points appeared during the initial Middle Paleolithic in Japan. They may be considered a *fossile directeur* of the Japanese Middle Paleolithic. However, the technology of their production was quite common: radial reduction of cores aimed at the production of blades. As a result, the presence of such flakes and tools in some regions of China and in the Altai, Gobi and elsewhere in East Asia (Siraishi Noriyuki, 1999) does not seem especially meaningful. The suggestion that the distribution of the *sachhook* point is the result of migration also does not seem tenable. These flakes may be the by-products of disc-core reduction. Lithic tools fashioned on such retouched flakes were used in Japan only during the Middle Paleolithic.

Levallois technology has not yet been identified in Japan (Sagawa Masatosi, 1998), so scholars have offered a number of hypotheses to explain its absence in the archipelago (e.g., Sato Hiroyuki, 1999).

Studies of the development of the flake tool tradition during the Middle Paleolithic in Northeast Asia require a clear understanding of its characteristic features. This tradition, as has been stated above, exhibits its own peculiarities in different regions and does not represent a homogeneous process in the development of a lithic industry. Diversification of tool types occurred due to differential utilization of such techniques of tool manufacturing including secondary treatment and retouch. The development of the tradition of flake tool manufacturing caused substantial changes in production of lithic tools analogous to Levallois artifacts. If Middle Paleolithic humans were not interested in transforming a large number of flakes into tools, there would be no tools on flakes in evidence, let alone a more advanced Late Paleolithic culture based on the prismatic reduction of stones.

Recent investigations have shown that Middle Paleolithic cultures, including those of the Levallois

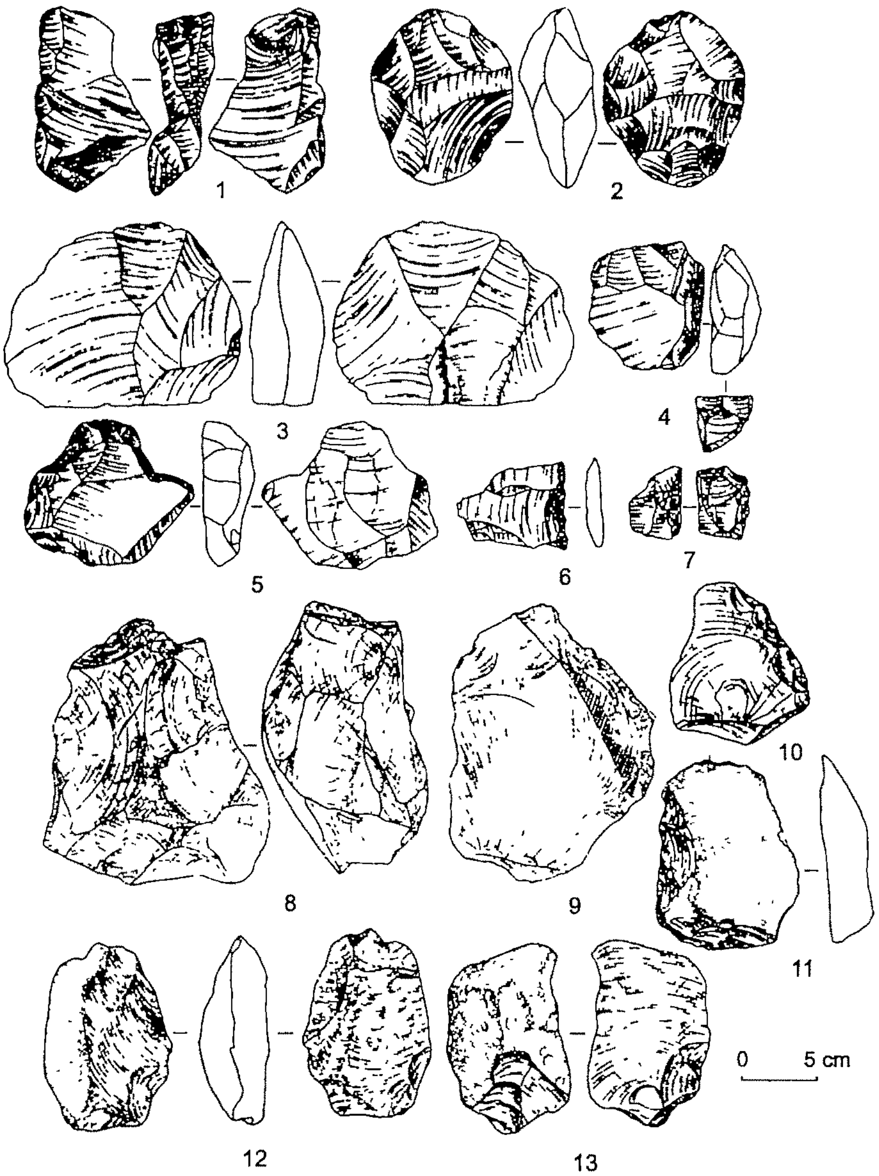


Fig 7 Lithic artifacts from the Middle Paleolithic sites illustrating a tradition of production tools on flakes

tradition, did not occur everywhere globally. The known cultures differ in age and in the degree to which they exhibit a common set of characteristic features. This phenomenon may be of relevance to archaeological materials recently reported from Northeast Asia. These finds are of great importance because they provide the basis for correlation with European Middle Paleolithic industries and for establishing specific features that distinguish them from their European counterparts.

Currently, the transition to the Middle Paleolithic in North China and Japan has been established at ca 150 – 130 ka (Sagawa Masatosi, 1998). This age estimate is supported by available radiometric dates and geological data obtained from the Korean peninsula (see Table 1). Middle Paleolithic humans gradually increased the sophistication of their technical potential in lithic tool production on the basis of the pebble tool tradition. Two lithic tool traditions developed from this Early Paleolithic foundation in Northeast Asia: the pebble tool and the flake tool traditions, both being characteristic of the Early Paleolithic in China. Specific local variants of these two technologies have been identified. The flake tool tradition is the result of development from an ancestral industry.

Conclusions

Firm chronometric boundaries for the Korean Middle Paleolithic cannot be established on the basis of currently

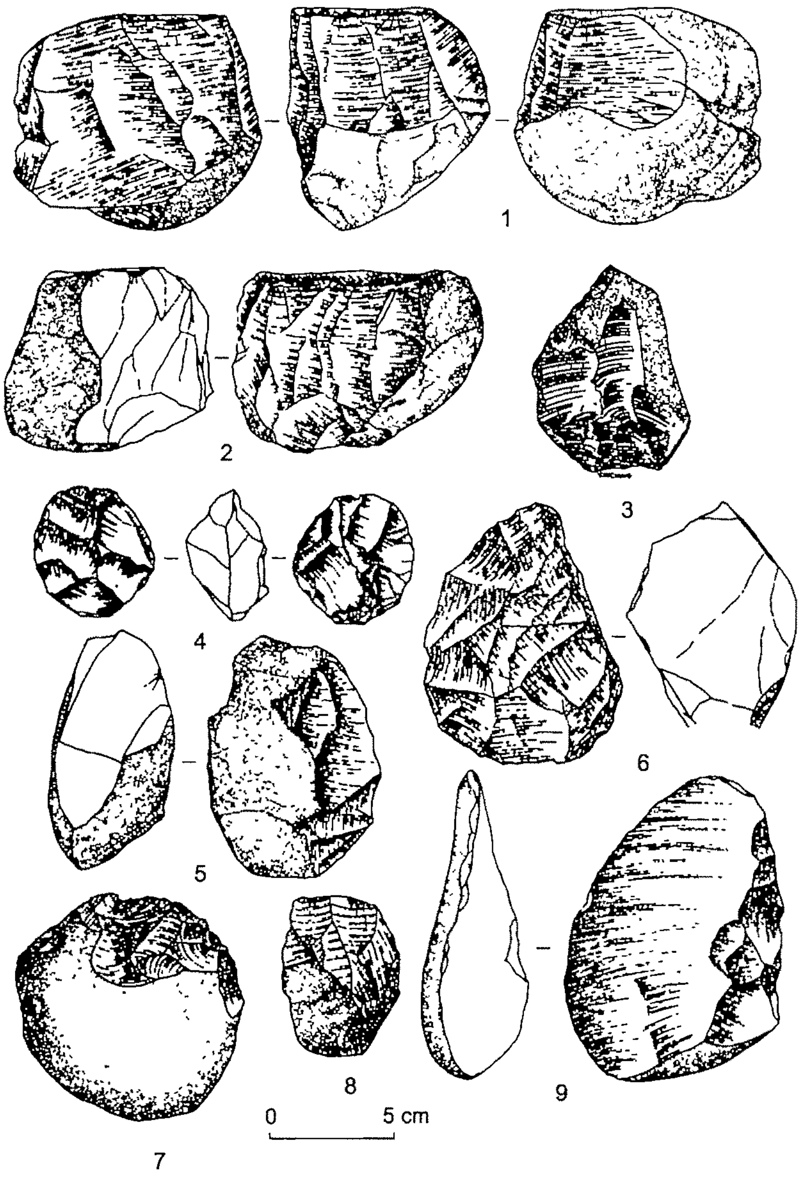


Fig 8. Cores (*1, 2*), *racloirs* (*3 – 8*), and a knife (*9*).

available data. Roughly, this period brackets the end of the Middle or beginning of the Late Pleistocene until ca 30 – 35 ka ago. A more precise definition of the boundary between the Middle and Upper Paleolithic has not yet been established. The Korean peninsula has yielded a lithic technocomplex different from those originating in neighboring territories. However, these cultures have at least one feature in common: all are based on the preceding Lower Paleolithic pebble tool tradition, which is replaced later by the flake tool complex. Its morphology retains many archaic features, although the occurrence of different flake tool types within this industry reflects development in the ancient human behavioral strategy. The quality of lithic tools increased and the tools themselves became more standardized. Apparently, the latter industry inherited certain features of the former, while the tradition of handaxe manufacture acquired local typological specificity to eventually be dispersed as one of the major lithic industries in the region. This tradition developed as a result of *in situ* evolution rather than of cultural diffusion or human migration.

Middle Paleolithic industries utilized various raw materials that were chosen according to the strategy of producing tools on flakes. During the Middle to Upper Paleolithic transition, flake tool technology continued to be developed. Various technologies of tool production are believed to have been practiced in many regions of

Northeast Asia prior to the final development of the blade technique. However, the specific nature of the development of laminar techniques has not yet been established. The available evidence suggests the existence of the pebble tool industry until around 30 ka ago.

No reliable evidence has been forthcoming on the origin of technocomplexes based on the Levallois technique in Northeast Asia, although they were widely dispersed over contiguous regions of Siberia and Mongolia. This fact suggests differences in technologies appearing in various regions of Asia during the process of cultural development. The appearance of a considerable numbers of flake tools in the tool kit based principally on the production of tools on complete cobbles constituted progress in stone reduction strategies.

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IMAGES OF SNOW LEOPARD AND SAIGA FROM THE KOK-EDIGAN AND TIANGYS-TYT SITES IN GORNY ALTAI

Introduction

Objects of decorative-applied art of the ancient Altai nomads, made in the Scythian animal style, have been the focus of researchers' attention for a long time. These objects serve as an important source for the reconstruction of the ideology, mythology, esthetic and religious ideas of ancient nomads. Remarkable articles of weaponry, horse harness, clothes, and house accessories made of various organic materials and decorated with zoomorphic images were found in burial mounds (kurgans) of nomadic nobility in the high-elevation areas of Gorny Altai. Such burial sites have been investigated in Bereli and Katanda by V.V. Radlov (1989: 446 – 450), in Bashadar, Pazyryk and Shibe by S.I. Rudenko (1960: 204 – 213) and M.P. Gryaznov (1950: fig. 10, 15), and on the Ukok Plateau by V.I. Molodin (Fenomen..., 2000) and N.V. Polosmak (1994: 90 – 96). Art objects formed in the animal style have been found in kurgans of the common nomads of Gorny Altai of the Scythian period (Kubarev, 1987: 35 – 38, 82 – 89, 95 – 122; 1991: 48, 106 – 131; 1992: 32, 84, 94 – 110; Surazkov, 1989: 28 – 29, 48 – 49, 74 – 75).

At sites of the Pazyryk Culture* on the middle Katun River, art objects of this sort are found quite rarely since in this area there is no ice within kurgans, so objects made of wood, leather, felt or other organic materials almost completely decay with time.

Description of the finds

In this junction, horn horse harness articles made in the animal style and found in the Pazyryk Culture kurgans at the sites Kok-Edigan and Tiangys-Tyt in the Edigan River valley, right tributary of the Katun River (Republic of Altai), present a definite interest. The excavations of the kurgans have been conducted by the South Siberian Team of the North Asian Multidisciplinary Expedition of the Institute of Archaeology and Ethnography SB RAS. A decorative plate – horn bridle strap connector – with a bas-relief Janus-faced image of the head of a predator-feline, most likely snow leopard, was found during the 1997 field season in kurgan N 13 at the Kok-Edigan burial ground (Hudiakov, 1999: 326).

Kurgan N 13 constitutes an element of the eastern chain of kurgans of the Kok-Edigan burial ground, located on a high terrace on the right bank of the Edigan River, approximately 3 km from the village of Edigan. The barrow of kurgan N 13, composed of both massive and small rock fragments, has a spherical, irregular roundish shape. From the south it abuts the barrow of kurgan 14, thus forming a common, gently sloping mound covering three deep burial pits These pits contained a single burial, a paired burial with two horses, and a burial with a horse. Judging from the construction features of the intra-burial structures, the presence of horses, and the characteristic features of the burial ceremony and grave goods, female representatives of the Pazyryk Culture were buried in all three pits. In the female

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* The Early Iron Age culture associated with nomadic tribes of Gorny Altai, who were related to the Scythinas.

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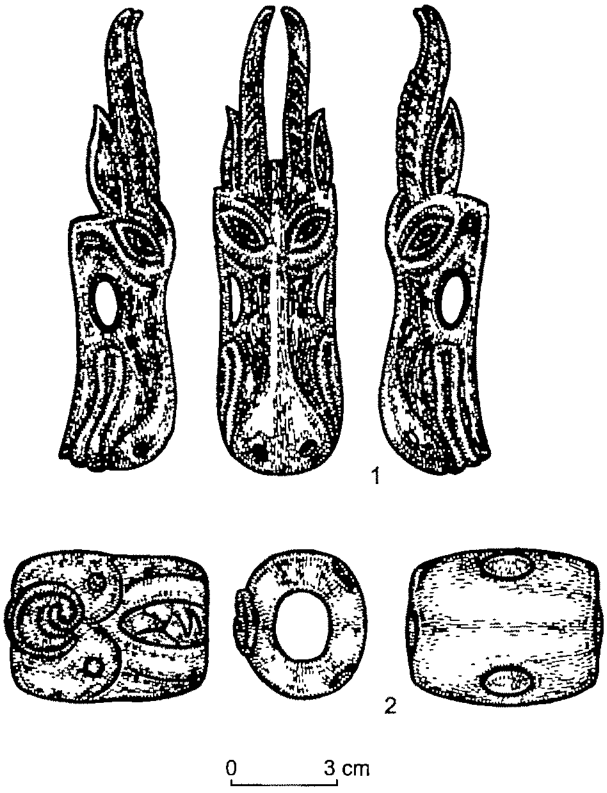

Fig 1. Horn plates-connectors from the sites in the Edigan River valley.
1 – Tiangys-Tyt, kurgan N 6, *2* – Kok-Edigan, kurgan N 13

burial with a horse of kurgan N 13, a full-sized mirror with a rounded disc and a rectangular loop-holder with a triangular hole was found (Hudiakov, 2001: 96). Grave goods found in this grave contained no votive miniature objects typical of the late stage of the Pazyryk Culture. This kurgan might be referred to the 5th – 6th centuries BC.

A decorative horn plate was found on the right side of the horse's skull. The horse was placed in the burial pit along the northern wall, above the skeleton of the buried woman. It is possible that the plate-connector could have served as a distributor for neck straps from the right side of the head. On the left side of the bridle there was no such connector. In other words, the bridle decoration was only on one side. This cylindrical connector is oval in cross-section, 4 cm long and 2.7 cm wide, with an oval aperture running through it. In the central part of the object, the aperture is connected with two perpendicularly positioned oval holes. Four cross-connected leather bridle straps can be put through these holes. The bas-relief image of a predator's head is positioned on the obverse surface of the connector. On the left side, in the center, there is a low bas-relief image of a disproportionately large ear with a spirally twisted helix. In the center, above and below the ear, there are rounded eyes and semi-rounded outlines of the head. On the right side there is a carved predator's snout with an open mouth showing expose teeth. The animal has disproportionately wide lips expanded to bare large, sharp, smoothly curved teeth. On the upper jaw there are three teeth shown, the middle one of which is an elongated fang. Teeth and a semi-oval protuberance are located below. Judging by the shape of the spirally twisted ear and the bared teeth, the connector occupied the main place on the right side of the bridle in the zone of the belts' connection. However, it was possible to place it on the left side of the bridle. In this case, the lower eye would have become the upper one, the teeth of the upper and lower jaws would have changed places, and the ear would have twisted into the spiral from the bottom. In both cases, the predator with his bared teeth was oriented forward, along the course of the horse's movement (Fig. 1, *2*, 2).

Another horn plate-connector with a volumetric image of a saiga* head was found in the 1999 field season during the excavations of kurgan N 6 in the Tiangys-Tyt burial ground (Hudiakov, Mironov, 1999: 541). This cemetery is located on a high terrace on the right bank of the Edigan River, 0.2 km from the village Edigan. The kurgan had a round, gently sloping spherical barrow composed of massive and small rock fragments. The barrow was situated within the eastern chain of kurgans. Under the barrow there was a deep burial pit, at the bottom of which there was a burial of an adult with a horse. This burial was disturbed by robbers. The burial had been robbed already in ancient times; the bones of the extremities of the corpse were moved at the joints, at a time when soft tissues of the corpse had not yet completely decayed. Under the cervical vertebrae of the horse's skeleton, placed in the grave along its northern wall, an accumulation of horn plates and buckles from the horse's bridle was found, including a decorative plate-connector with the image of a saiga head. In accordance with the finds, this kurgan refers to the classical stage of the Pazyryk Culture (6th – 4th centuries BC) (Ibid.). On the inside, the plate-connector has a vertical slot, linked with two perpendicularly positioned side holes. Leather straps were possibly put through this slot and holes. This plate could have served as a T-joint strap distributor. This system of connection could have referred to the horizontal noseband of the bridle and an additional vertical strap connecting the noseband and the browband. This plate-connector (8.2 cm long and

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* Saiga is an artiodactyla animal inhabiting steppes and semideserts of Central Asia.

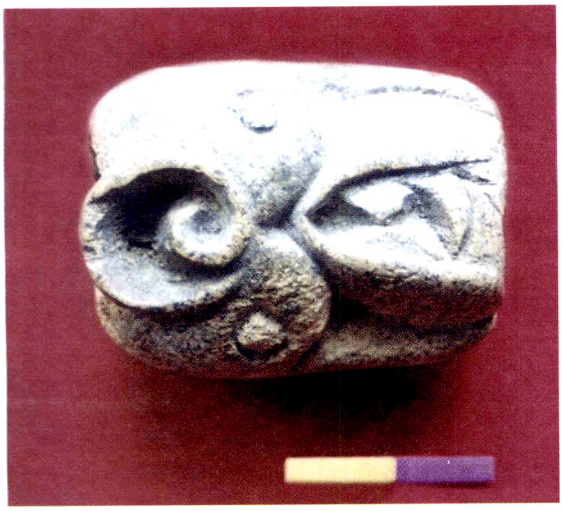

Fig. 2. Horn plate-connector with an image of a snow leopard's head from the Kok-Edigan burial ground.

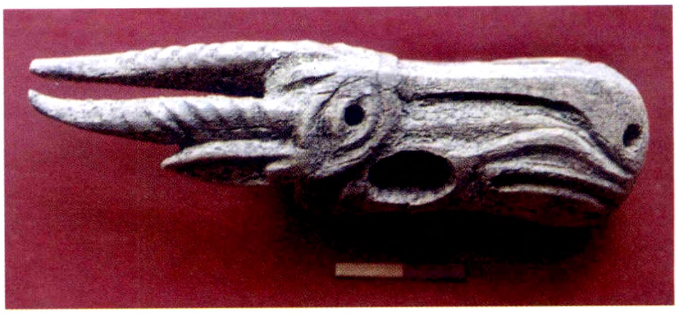

Fig. 3. Horn plate-connector with an image of a saiga's head from the Tiangys-Tyt burial ground. View from the left.

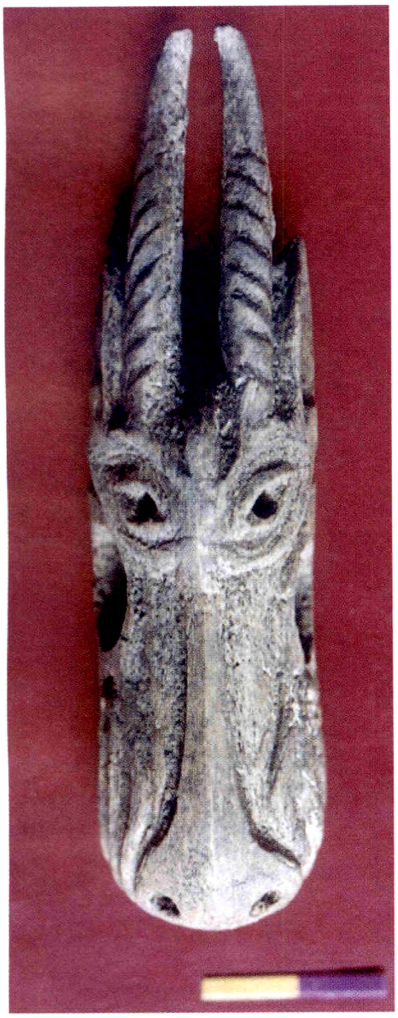

Fig. 4. Horn plate-connector with an image of a saiga's head from the Tiangys-Tyt burial ground. Full face view.

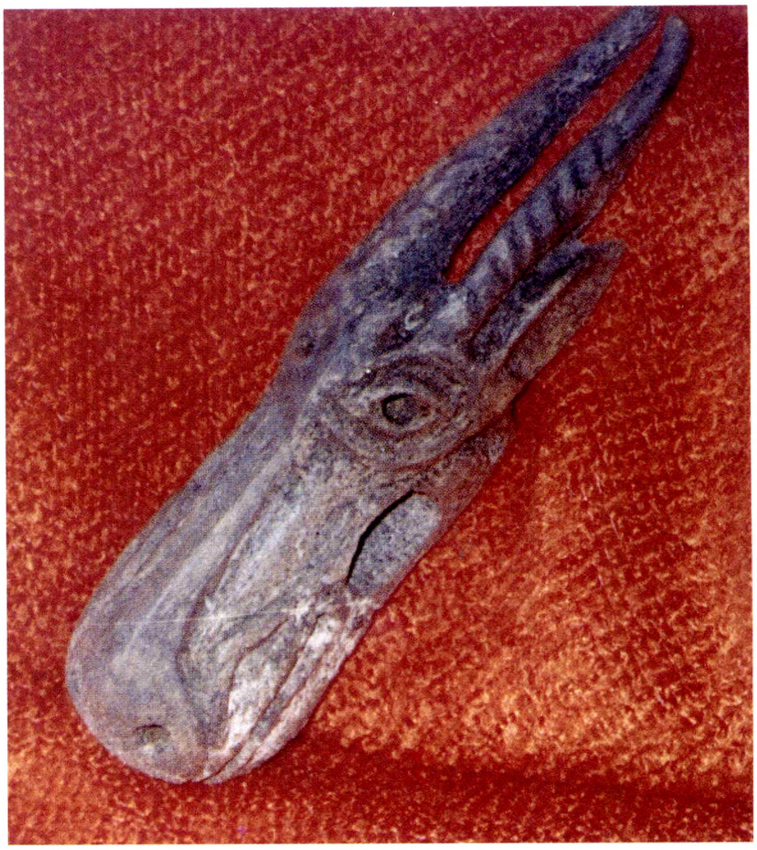

Fig. 5. Horn plate-connector with an image of a saiga's head from the Tiangys-Tyt burial ground. View from the right.

2.2 cm wide) should have been fixed in the central part of the noseband, in the place of its connection with the additional vertical bridle strap. The image on the plate, occupying its entire outer surface, is made in the shape of a volumetric sculpture. In accordance with traditions of the Scythian-Siberian animal style, the image is inserted in the dimensions of the original blank, and due to this, various parts of the animal head seem disproportionately sized. About a half of the surface is occupied by the image of an animal face with a large, rounded nose and small, oval nostrils, a large mouth and tightly clenched thick lips. On the cheeks, there are oval holes for the noseband. The upper part of the saiga's head is very small, occupying about a quarter of the total length. The main portion of the head's upper part is occupied with large almond-like, symmetrically positioned, slanted eyes with rounded, deepened pupils and wide eyelids. Long, slightly twisted horns with forward-bending ends are depicted emerging from the sinciput. They are symmetrically positioned on both sides of the longitudinal protuberance on the crest of the skull. On the outer frontal surface of the horns, there are ribbed protuberances. Right next to the horns, on both sides of the head, long, vertically standing ears with sharpened ends are carved. In spite of the existing disproportions and stylization, the sculptural image of the saiga head is very expressive, reflecting all the characteristic features of this wild ungulate (see Fig. 1, *1*, 3 – 5).

Conclusion

A predator of the feline family (tiger, panther, or snow leopard) was one of the most popular images of the Scythian-Siberian animal style (Akishev, 1984: 48; Perevodchikova, 1994: 42 – 46). This feline image was shown tormenting or suppressing ungulates, rolled up into a ring or as a separate head of a predator with an open mouth, full-face or in profile. The Pazyryk people often depicted predators (Rudenko, 1960: 280). This image symbolized strength, cruelty and bloodthirstiness. On the plate-connector from Kok-Edigan there is shown an unusual two-sided, Janus-like, depiction of the eyes and the predator's open mouth. Due to the unusual way of showing the animal, the figure shows an angry snow leopard, whether placed on the right or on the left side of the bridle. This method of depicting the leopard head might be associated with the protective function of this element of bridle decoration. The snow leopard had to symbolically protect both the horse and the rider.

Images of the saiga are rarely encountered in Scythian-Siberian art, including the Pazyryk animal style (Ibid.: 270). When they were shown, these animals were depicted as victims in scenes of torment. Sometimes, only heads were represented. Most likely saiga, one of the fastest and tireless wild ungulates of the Eurasian steppe zone, could have symbolized quickness and indefatigableness on the run. The wish that the horse would be as fast and indefatigable as the saiga might be embodied in the sculptural images of the saiga's head on the bridle.

Horn elements of the horse's harness with bas-relief or sculptural images of heads of carnivores and ungulates found at the Pazyryk Culture sites in the Edigan River valley indicate that the nomads of Scythian times inhabiting the valley of the middle Katun, just as inhabitants of highlands of the Altai, possessed the technique of bone and horn carving and could have reproduced various bas-relief and sculptural images of characteristic figures of the Scythian-Siberian animal style. The comparative rarity of such objects at the Pazyryk Culture sites on the middle Katun might be the result of the fact that objects made of organic materials are normally not preserved in burials.

Among metal artifacts found during the excavations of the Pazyryk Culture kurgans on the middle Katun, bronze daggers, *chekans* (fighting axes), quiver hooks, decorative belt buckles, and sewn-on plates with images of eagle and griffin heads, figures of wild boars, heads of mountain goat and other animals are encountered (Neverov, Stepanova, 1990: 266 – 268; Hudiakov, 2001: 95). Judging from these finds, artifacts made of various materials with images formed in the animal style were spread throughout the whole territory of the Pazyryk Culture, including the northern areas of Gorny Altai.

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EDGING IN IMAGES MADE IN THE URAL-SIBERIAN ANIMAL STYLE

Introduction

The Ural-Siberian animal style has long been the focus of researchers' attention. V.A. Oborin (Oborin, 1976; Oborin, Chagin, 1988), L.S. Gribova (1975), L.V. Chizhova (1983), R.D. Goldina (1985), and others have all devoted studies to this issue. A significant amount of material characterizing this style is given in the book *Ugric Heritage* (Ugorskoye naslediye, 1994). Such publications consider the main semantic and stylistic traits of zoomorphic and anthropomorphic images. The Permian and West-Siberian animal styles are so rich and variable, however, that they are sure to serve as objects of reflection and research for a long time to come.

To the present, no examination has been done on the artistic element of edging, encountered on the majority of objects. This element can be used for the dating of the objects and attributing them to the Ural-Siberian animal style. The issue of the edging in this artistic style was raised in 2000 by T.N. Troitskaya in a paper presented to the international archeological conference *Russian Archaeology: Achievements of the 20th and Perspectives of the 21st Centuries* (2000: 290 – 292). In this article we shall try to develop ideas expressed in that paper, and consider some aspects of this issue in more detail. The main objective of the article is to identify the toreutic objects made in the Ural-Siberian animal style or in the so-called "Permian" style. These objects include zoo- and anthropomorphic images decorated with a peculiar edging composed of small squares, rhombuses, circles, and ovals.

Typology of edgings and their dating

In dictionaries, edging is normally defined as a narrow colored string or strip of fabric attached along the edges or seams of clothing, or it is a strip framing a picture, table, etc. In toreutics, edging is a narrow strip framing an article or accentuating its separate parts. We shall not examine all of the edging types, since stripes composed of circles, squares and other geometric figures can be found over a relatively wide chronological and geographical range and can be attributed to different cultures. We shall examine only the edgings occurring on articles made in the Ural-Siberian animal style of the Poloma, Lomovatovo, Potchevash, Relka, Upper Ob, Orontur, Ust-Ishim and other forest and forest-steppe cultures (Finno-ugy i balty..., 1987: plate 60, 70, 71, 78, 81, 82 et al.). These edgings are one of the main characteristic features of the Ural-Siberian style. They can be found on most of the zoo- and anthropomorphic objects.

The edgings under consideration occurring in association with zoo- and anthropomorphic images are found only in the forest and forest-steppe (northern part) zones of the Urals and West Siberia. West of these regions, this ornamental motif is seldom encountered. This shows a Ural influence. Such ornamentation is known from a pendant with horse images of the Ves people and a plaque with an image of a horseman referred to the beginning of the 2nd millennium AD (Golubeva, 1987a: plates 20, *20, 21*; 1987b: plate 41, *5, 8*). L.A. Golubeva connects their origin with the Kama River region (Ibid.: 59), where the majority of objects made in this style came from (Oborin, 1976; Goldina, 1985). The easternmost finds have been reported from the Achinsk-Mariinsk steppe region; they have also been found at Aidashinskaya Cave (Molodin, Bobrov, Ravnushkin, 1980: plates VI, XX – XXII). Artifacts are also known from collections of the Ishim River (Matveeva, 1994: fig. 69, 70) and the Middle Irtysh River regions (Konikov, 1993: fig. 40 – 42, 44, 45, et al.).

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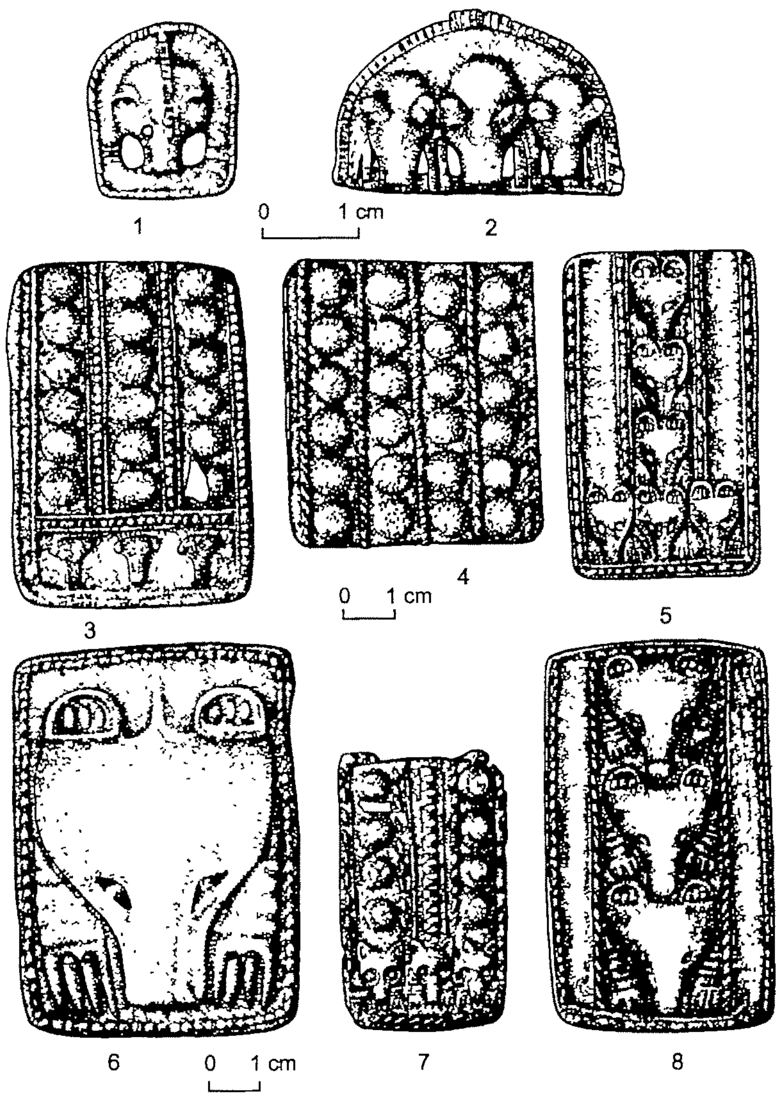

Fig 1. Plaques with bear images.
1, 2, 5, 6 – the Kama River region, *3* – Aidashinskaya Cave, *4* – Yamal Peninsula, *7, 8* – the Novosibirsk region of the Ob River basin (*7* – a casual find, *8* – Krasny Yar-1)

In the Ob River region, articles of the Ural-Siberian style can most often be found at the sites of Potchevash, Relka, and Orontur cultures (Chernetsov, 1953: plates IV, XII; 1957: plates VII, VIII, XVIII, et al.; Chindina, 1991: fig. 21, 22). They are also encountered in the Tomsk and Novosibirsk regions of the Ob basin, where they are attributed to the Verkhneobskaya (Upper Ob) Culture (Belikova, Pletneva, 1983: fig. 60, 63, 73, 78, 79, Troitskaya, Novikov, 1998: fig. 18, 19). Southward, in the steppe zone of the Altai, such articles have not yet been found.

The analysis conducted in this paper is based on the examination of 186 flat and three-dimensional images produced in the Ural-Siberian animal style. The sample includes fifty-nine West-Siberian plaques studied in the museums of Tomsk, Novosibirsk, Omsk and Tumen; the rest of them (finds from the Urals and the Kama River region as well as from Aidashiskaya Cave and from collections placed with museums in Ekaterinburg) were examined using publications. Anthropomorphic images have not been included in the statistics. The analyzed artifacts were intended for long-term use. This can be seen from the durable loops designed for fastening the objects on clothing, as well as from the bracelet-like shape of some of the objects.

Let us consider issues of the origin and chronological frames of the distribution of the described edgings. In the Kama River region, the earliest sample of this figuration is a badge with a plaque decorated with a bear

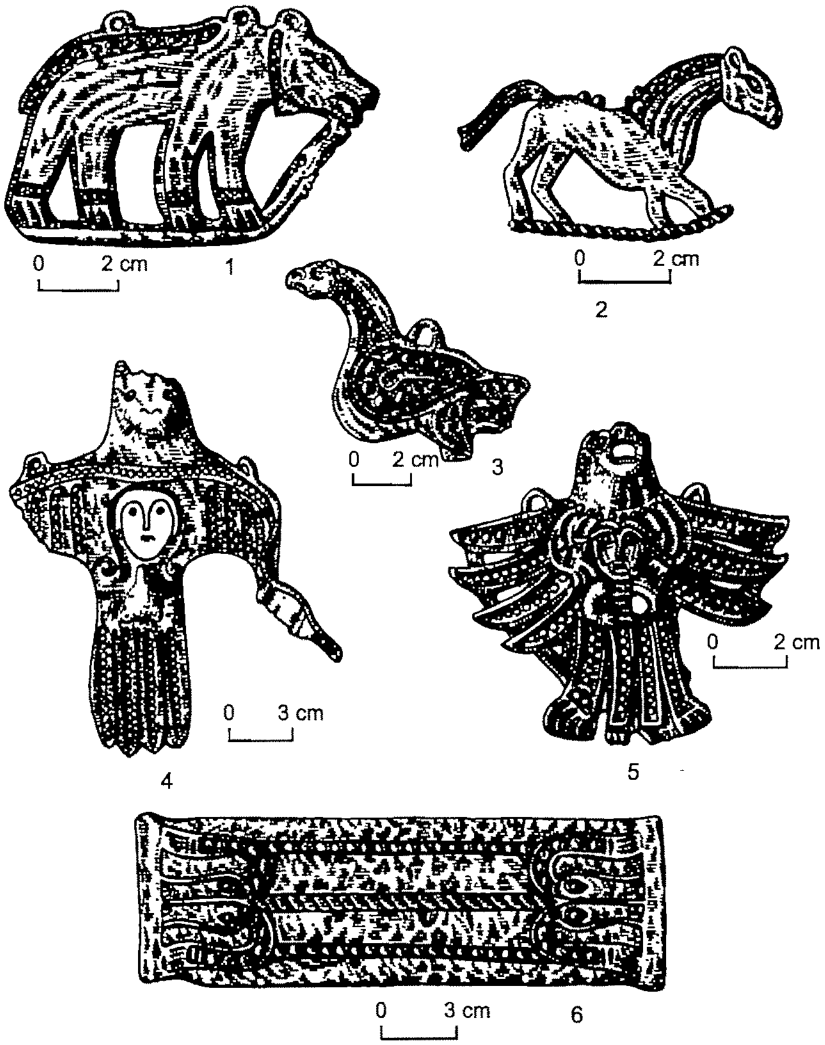

Fig. 2. Toreutics specimens with edgings
1 – Timiryazevsky II burial ground, *2* – Relka burial ground, *3* – Lipkinsky burial ground, *4* – Okunevo burial ground, *5* – Vasyugan hoard, *6* – Aksenovo burial ground

head image from the Glyadenovo *kostishe** (Fig. 1, *6*). It is dated from the 2nd – 3rd centuries AD (Oborin, 1976: plate 25). The origin of the edgings in this region was probably associated with the imitation of small twisted braids resembling inserted circles on round plaques of epaulet-like clasps (Genning, 1970: plates XII – XIV).

The widest distribution of the articles with edging refers to the 5th – 7th centuries AD. The upper date varies in different regions. Thus, in the Urals as well as in the Middle and Lower Irtysh regions, objects with edging referred to the first half of the 2nd millennium AD are found at sites representing the Rodanovo, Ust-Ishim, and Kintusovo cultures (Finno-ugry i balty..., 1987: plates 66, 71, 82, 89). In the Novosibirsk and Tomsk regions of the Ob basin, articles made in the Ural-Siberian animal style disappeared by the 8th century due to the appearance of the Turks and their influence. At that time, or perhaps somewhat later, such articles disappeared from the Middle Ob region. In that region, rare samples of animal style examples were found; they refer to the beginning of the 2nd millennium AD (Fig. 2, *6*). These are bracelets with images of bears portrayed in sacrificial poses (Yakovlev, 1993: 151). It should be stressed that no objects made in the Ural-Siberian animal style have been found in the domain of Turkic influence.

In terms of manufacturing, the edgings may be subdivided into three groups. The first group is represented by strips composed of scratched figures. On the model, a little away from the edge, two parallel lines were scratched. The space between the lines was dissected with squares and rectangles. The wings of a predatory bird depicted on one of the plaques were emphasized precisely in this manner (Fig. 3, *3*). Most often the scratched edgings outline the whole object or only a part of it (Fig. 3, *4*). Such edgings were used to represent horse manes (Oborin, 1976: plate 36).

Edgings of the second group are encountered more often. Two parallel lines were streaked on a wax model. Between these two lines, a row of small geometric figures was placed on a recessed background. Characteristically, the figures do not rise above the level of the plaque itself. They can be round or oval (see Fig. 1, *3*, *5*) as well as rectangular or square (see Fig. 3, *4*, *6*). Some figures are rhombic; to all appearances, they could imitate a twisted braid (see Fig. 1, *4*, *7*). Oval, round, rhombic and rectangular figures sometimes coexisted on the same plaque (see Fig. 1, *8*). Such edgings normally framed the plaque made in the animal style on three or four sides. In some cases, the scratched lines are not straight, but closed. These closed lines framed a cartouche, inside of which small geometric details were located. Cartouches may be long, narrow, or tear-shaped. The elongated cartouches usually expressed bird plumage (see Fig. 2, *4*, *5*), while the large, tear-shaped ones showed wings of aquatic birds (see Fig. 2, *3*). A rectangular cartouche is depicted on a plaque from the Vysoky Borok site (see Fig. 3, *1*).

The third group is represented by edgings consisting of a strip placed along the edge of a wax model and slightly elevated above the general level of the plaque. Short lines were scratched on the strip, dividing the surface into small squares and rectangles (see Fig. 1, *1*, *2*). Often the strip looked like a pseudo-braid. The third group of edgings are normally frames surrounding an image (Oborin, 1976: fig. 57). Another method is known for raising the details of the edging slightly above the object's general level: first, a groove was made on the model using a chisel-like instrument, then rectangular, square, oval, or other pieces of wax were attached to the model's bottom (see Fig. 3, *5*). One object may have edgings of different types. Thus, for example, on a pendant with a syncretic image of a bird-bear, there are edgings produced by both the first and second methods (see Fig. 3, *4*).

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* A sacrificial place marked by an accumulation of animal bones

An edging may frame not the whole plaque, but some of its parts. Thus, on a plaque decorated with images of bears, the edgings stretch along the whole side of the article and frame a vertical row of heads on both sides (see Fig. 1, *8*). On plaques with horizontally distributed bear heads, the edging can divide the rows of large oval projections (see Fig. 1, *3*). On the images of the bears, edging may be positioned along the animal's back, framing its figure or separating the paws from the head (see Fig. 2, *1*). According to some researchers, an edging on the neck and paws may imitate a necklace and bracelets. Similar decorations put on the bear in honor of the Bear Feast are known from ethnographic sources. V.F. Karyalainen notes that Ugric people had a custom of decorating the neck of a killed bear with a beaded collar and its fingers with rings (1996: 152–153).

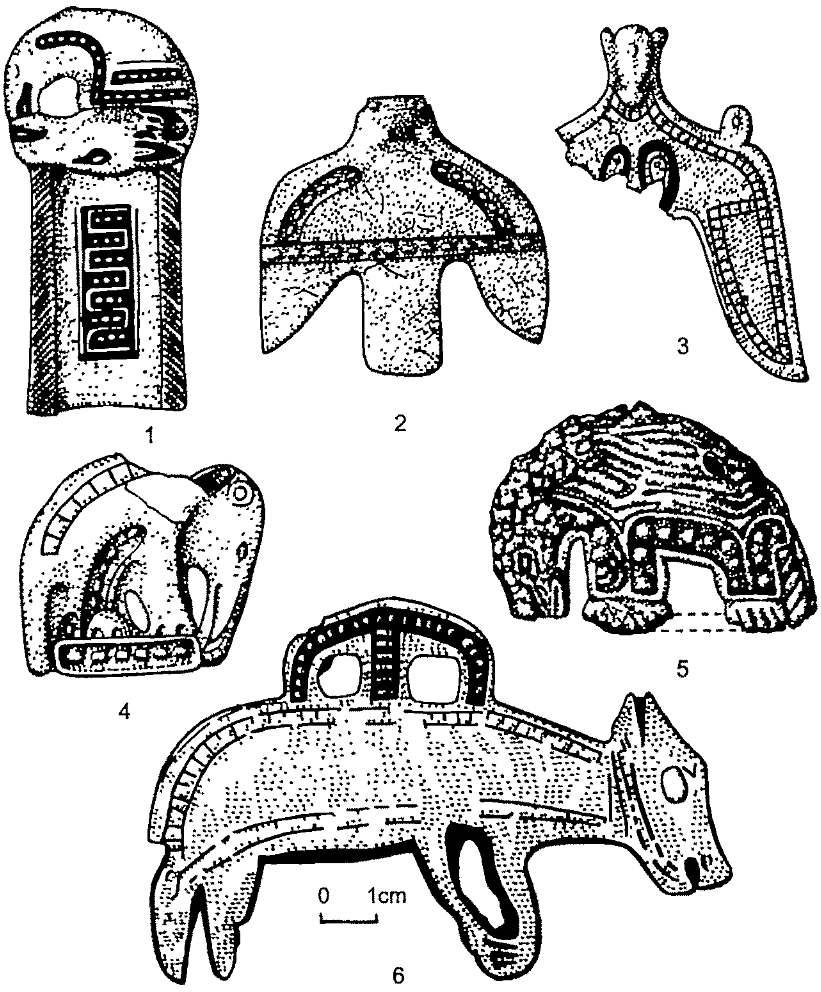

Fig 3. Artifacts with edging from kurgan burial grounds of the Novosibirsk region of the Ob River basin
1, *3* – Vysoky Borok, *2* – Yurt-Akbalyk-4, *4* – Ordynskoye-1, *5* – Starobibeevo-6, *6* – III Kordon-1.

Let us consider in more detail a plaque in the shape of a bear, found not far from Novosibirsk during the excavations of the defensive system of fortified settlement III at Kordon-1, attributed to the late stage of the Kulay Culture* (see Fig. 3, *6*). This plaque has been published many times (Roslyakov, 1990: 62 – 63; Molodin, 1992: 35, fig. 27; Troitskaya, Durakov, 1995: 30, fig. 2, *3*). S.G. Roslyakov attributed this object to the Kulay Culture since it was found at a fortified settlement ascribed to this culture. V.I. Molodin dates the figurine to the period within the first half of the 1st millennium AD. T.N. Troitskaya and I.A. Durakov, based on the absence of a strip connecting the face and paws of the animal (a characteristic feature of the technique this figurine was cast in), attributed this plaque to the Kulay Culture. However, considering all the features of the plaque, including the character of its edging, this article should be attributed to an earlier period than the Kulay epoch – that is, the 6th – 7th centuries AD, when the animal style was most widespread in the forest-steppe zone of West Siberia. The figure on the back of the bear may be regarded as a bird.

Edgings were used not only in images made in the animal style. They are found just as often on anthropomorphic plaques. Here belts, neckbands, elements of loin-covering belts, beads, bracelets, and other articles were depicted by scratched edgings (Oborin, 1976: plates 63, 64, 66 – 70). False twisted edging contoured the figures of humans and human-animal creatures. Edging was also used to depict human beards (Ibid.: plate 65).

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* The Kulay Culture was formed in the taiga zone of West Siberia. It is referred to the Early Iron Age

In some cases edgings typical of the Permian style are encountered on plaques having no human or animal images. These are rectangular plaques with rows of large oval bulges – "pearls" (see Fig. 2, *4*). The rows are separated from each other by edgings shaped like false-twisted braids. Edging of the same type contours the plaque from both sides. As it seems to us, such plaques have a direct relationship with the animal style and the bear cult. In fact, plaques with images of three horizontally positioned bear heads look exactly the same. There are usually only two of such rows (see Fig. 2, *7*) but on a plaque from the Aidashinskaya Cave there are three rows (see Fig. 1, *3*). It is most likely that in the visualization of people of that period of time, the rows of oval bulges or "pearls" were inseparably linked with honoring the bear.

Conclusion

As stated in this article, edging consisting of small squares, rectangles, ovals and false-twisted braids is a characteristic and an inseparable feature of the Ural-Siberian style. It existed from the 4th – 5th to the 8th century AD in the forest-steppe region, and up to the 12th – 13th centuries in the forest region. The same edging embellished anthropomorphic figures.

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AN ELITE BURIAL OF THE PERIOD OF EARLY NOMADS IN TYVA
(a preliminary report of the 2001 Russian-German Archaeological Expedition)

Introduction

The Arzhan-2 burial–memorial site, which contains the burial reported, is located in the north of the Tyva Republic in the Uyuk depression, known among the local people as the "Valley of Kings." Here one of the largest Asian necropolises of the Scythian period is situated. Four burial mounds (kurgans) can be clearly distinguished among the others: they are stone platforms, not very high but large in diameter (Fig. 1). From 1971 to 1974, one of these kurgans was investigated by M.P. Gryaznov and M.Kh. Manai-Ool.

The Arzhan-2 kurgan, 2 m high and with a surface diameter of 80 m, was chosen as the object of our study because it was severely damaged in the course of stone collection for building purposes in the 1960s. Our expedition began archaeological investigation of this site in 1998. The site was thoroughly mapped, and geophysical surveying of the kurgan and a large adjacent area was performed. As a result, we uncovered more than 200 ritual stone annular constructions located near the kurgan. In 2000, we investigated some of these stone constructions and started the excavations of the burial mound. This work allowed us to choose an optimal methodological approach to the archaeological investigation of the object.

In the 2001 field season, which lasted from May to late July, we excavated a quarter of the total visible portion of the kurgan and found a round slab construction consolidated with clay, which was surrounded by a stone enclosure and faced with vertical stone slabs (Fig. 2). The details of this complex structure are still to be revealed. Excavations of the mound yielded many slabs with petroglyphs among other stones, which were brought there together with other building materials from a quarry located 2 km from the site. During excavations, it was revealed that the kurgan was built above an ancient settlement dating to the Bronze Age (Fig. 3). The ancient layer yielded numerous fragments of decorated ceramics, animal bones, and other traces of household activities (Fig. 4). This important chronological element of the site needs further investigation. A surprising and important result of the 2001 season was the discovery of intact tomb 5 under the mound – an elite burial of the epoch of Early Nomads* (Fig. 5).

A rectangular 5.5 × 4.5 m grave pit 4 m deep was oriented with its long side to the northwest–southeast. The pit contained an outer burial chamber with double round-log walls. An outer chamber 1.4 m high was built of ten courses of round-logs and roofed with twenty-four logs lying along the southwest–northeast (Fig. 6). The inner size of the outer chamber was 3.3 × 3.6 m. It contained an inner chamber formed by six rows of crossbeams made of large round-logs. The dimensions of the inner chamber were 2.6 × 2.4 m (measured from the inner side). The inner chamber

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* Publication of the materials found in other tombs is beyond the scope of this article

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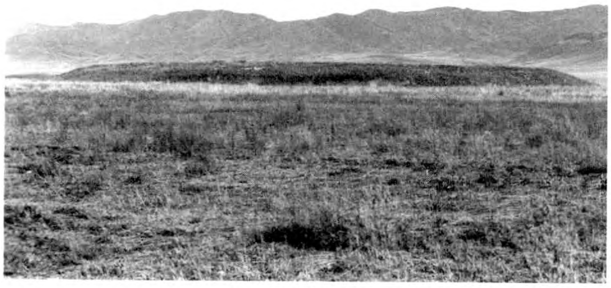

Fig. 1. Arzhan-2 kurgan. Northern view.

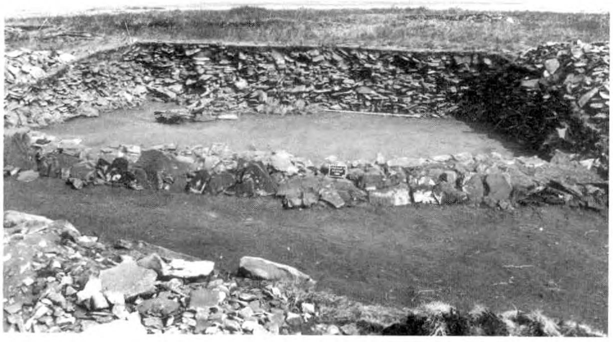

Fig. 2. Arzhan-2 kurgan. A ring-shaped stone enclosure.

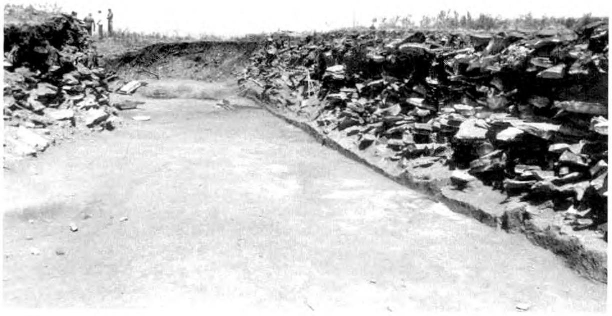

Fig. 3. Remains of a cultural layer at a Bronze Age settlement under the Arzhan-2 kurgan.

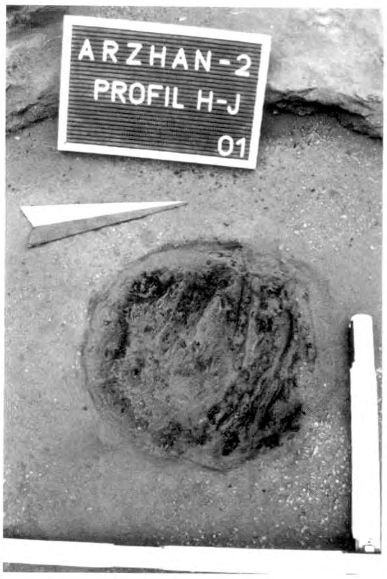

Fig. 4. Fireplace of the Bronze Age settlement under the Arzhan-2 kurgan.

was roofed by eleven logs placed perpendicular to the direction of roofing of the outer chamber. The roof logs of the inner chamber were supported by the upper crossbeams of the logs forming the northwestern and southeastern walls, which were displaced inwards (Fig. 7). Disassembling the inner burial chamber, we found a wooden dish placed on its edge in the space between the northeastern walls of both chambers. The walls of the inner chamber were thoroughly hewed but the overlapping logs in the corners were left round (Fig. 8). After the interment, the pit was filled with clay up to the buried soils. With time, the roofs of both chambers caved in along the southeastern wall because the upper crossbeams along this wall broke in the corners. Although a small amount of clay got into the chamber through the gaps in the roof, the larger portion of the inner chamber was not filled with earth.

In the center of the chamber, male (skeleton 1) and female (skeleton 2) human remains were found*. The deceased were lying with their heads pointing northwest on their left sides with bent knees; left hands were stretched along the bodies and right hands were bent. The skulls were displaced, which was probably due to decomposition of the pillows on which they were lying (Fig. 9, 10). The skeletons were preserved extremely poorly, which was obviously due to the microclimatic conditions of the empty space of the chamber, enhanced by decomposition of organic materials. The chamber floor was covered with a layer of a moist jelly-like substance whose thickness reached 5 cm in some places. The bones placed in this extremely aggressive medium decomposed and could have been traced only by their impressions. However, the chamber itself and wooden objects preserved well, and owing to this fact, we can reconstruct some details of the inner arrangement of the grave. Along the walls, there were thin sticks fixed on vertical poles, which probably served as a frame for wall hangings. The poles, whose ends were inserted in the special mortises in floor planks, were used to suspend some grave goods, such as a dress belt with a baldric for wearing weapons. These objects were found on the northeastern wall (Fig. 11). A *chekan* (a battle-axe), a scourge, and a *gorit* (a case combining quiver and bow-sheath) containing a bow and arrows were attached to the belt.

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* The field anthropological observations cited are preliminary and will be further specified by specialists.

The iron battle-axe had a wooden hilt with an iron tip on the end. Although the metal was strongly corroded, one can see that once all iron parts of this axe were encrusted with gold.

The scourge handle, 40 cm in length, was decorated with rings of golden foil and terminated in ponderous golden pommels. Gold patterned clips were found near the pommels.

The *gorit* had a wooden rib covered with golden foil (Fig. 12), and its drop-shaped bottom was made of gold. These golden parts were decorated with a stamped pattern of large scales. The leather base of the *gorit* did not preserve but its contour can be reconstructed by numerous golden plaques depicting figures of wild boars, which were sewn along the contour of the *gorit*, along the central line of its right side, and on its inner side. The *gorit* consisted of a quiver for arrows whose upper end was decorated with golden plaques and, probably, of a leather case for a bow, which was fastened to the backside of the quiver. The position of the plaques and traces of decorations suggest that the leather case could have been worn separately. The iron arrowheads were strongly corroded and agglomerated into a monolith (Fig. 13). After the monolith was removed, it was found that in addition to iron arrowheads, the quiver also contained bone bullet-shaped arrowheads and at least one bronze arrowhead. Some iron arrowheads were gilded and decorated with a curved pattern. The arrowhead shafts were completely preserved; their upper ends were painted red. The upper part of the bow, which one could see sticking out of the *gorit*, was decorated with patterned (ring-shaped and in the form of a flame torch or antlers) plaques of gold foil. Cast golden plaques depicting a feline were attached to the central part of the bow.

A golden pectoral (an adornment worn on the breast as an ornament, protection, etc., as a breastplate) and, probably, leather vessels from which only wooden plugs were preserved hung in the western corner of the chamber. Obviously, the vessels formerly contained the grain that was found scattered in the corner*. Here one bronze and two stone vessels were found. Small fragments of horn suggest that there was one more vessel made of horn**. A wooden ladle with a handle wrapped with golden stamped foil and composite wooden combs found nearby could

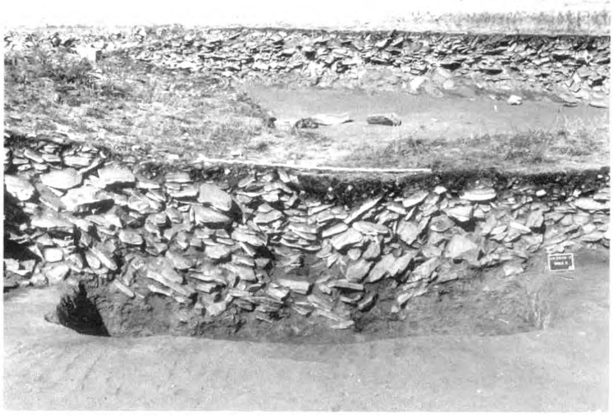

Fig. 5. Grave 5 before excavations. Arzhan-2 kurgan.

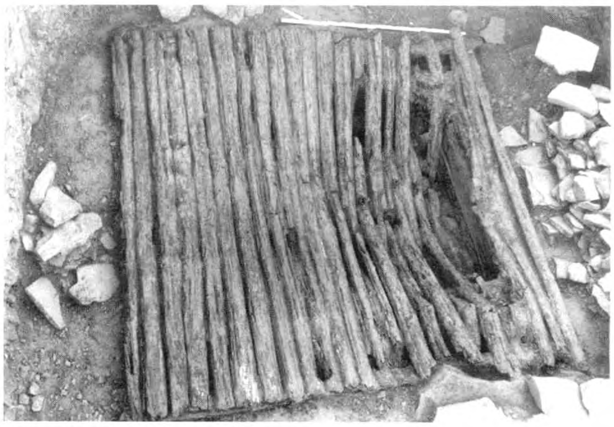

Fig. 6. Roofing of the external chamber of grave 5. Arzhan-2 kurgan.

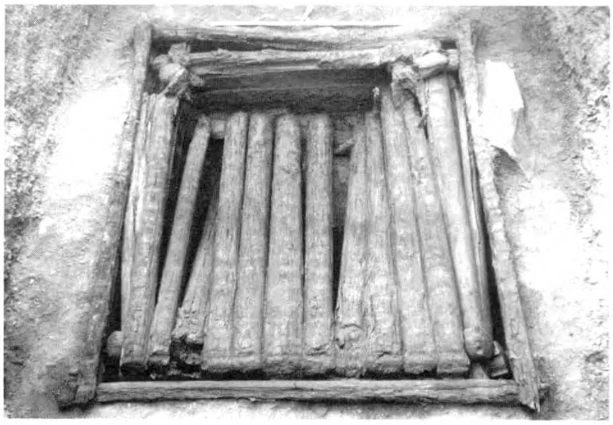

Fig. 7. Roofing of the internal chamber of grave 5. Arzhan-2 kurgan.

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* We found three kinds of grain. For more details see the appendix to this paper.

** To be more certain about this, special analysis of the fragments is required.

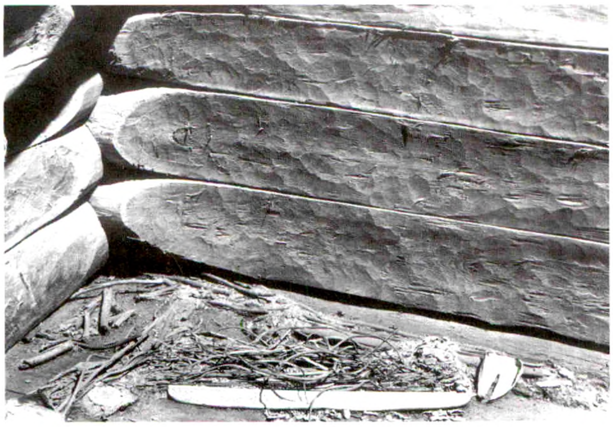

Fig. 8. Corner of the burial chamber with the *gorit* and arrows, the bow, the *chekan*, and the bronze mirror in the foreground. Arzhan-2 kurgan.

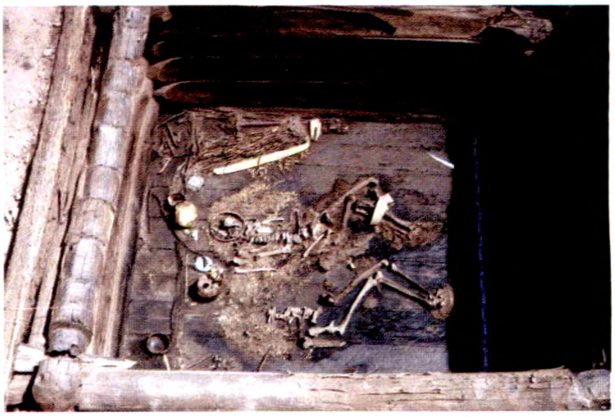

Fig. 9. General view of grave 5. Arzhan-2 kurgan.

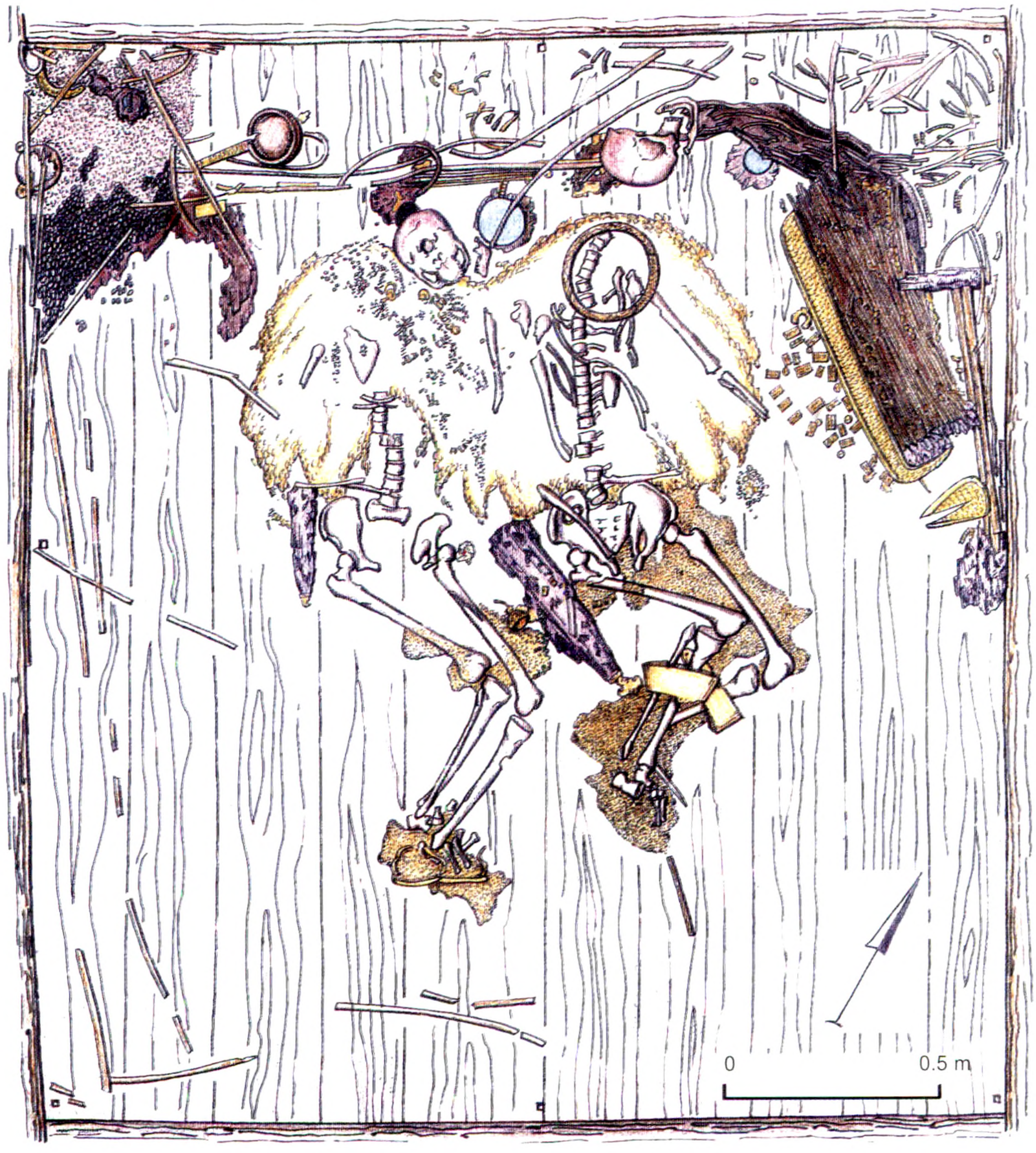

Fig. 10. Plan of grave 5. Arzhan-2 kurgan (drawing by V. Efremov).

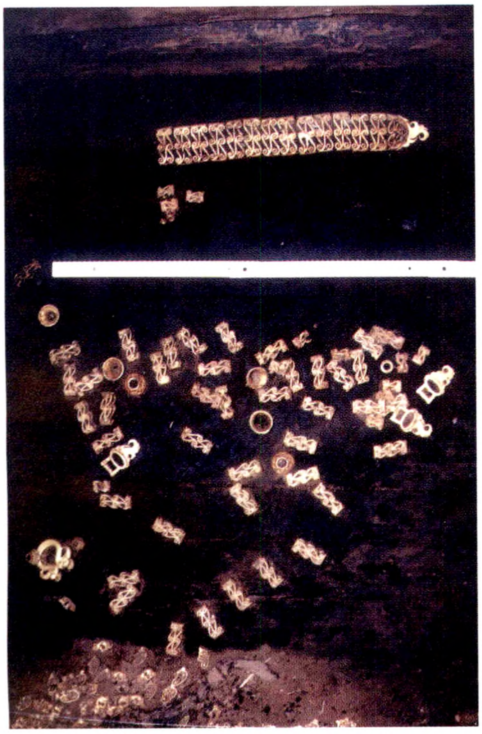

Fig. 11. Baldric adornments. Arzhan-2 kurgan, grave 5.

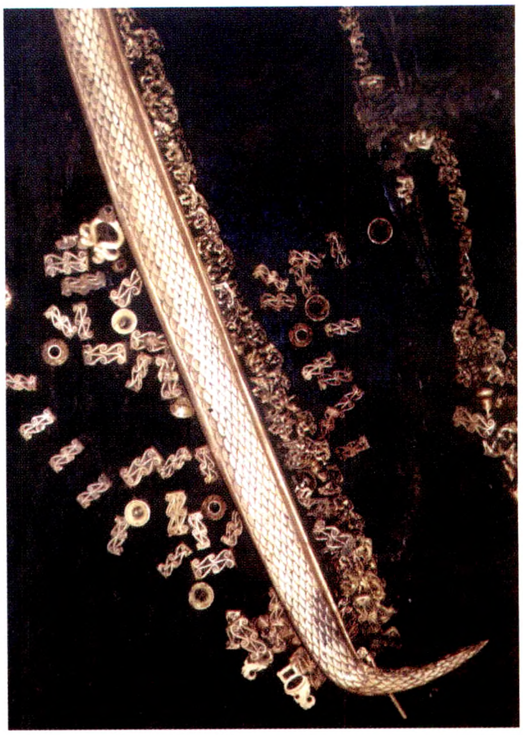

Fig. 12. Gorit's details. Arzhan-2 kurgan, grave 5.

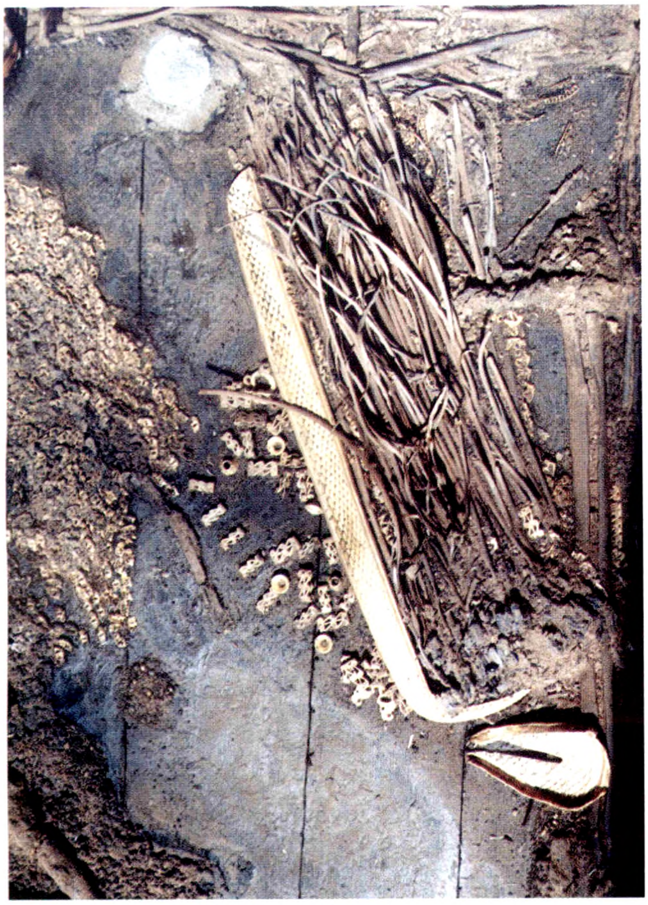

Fig. 13. Quiver with arrows. Arzhan-2 kurgan, grave 5.

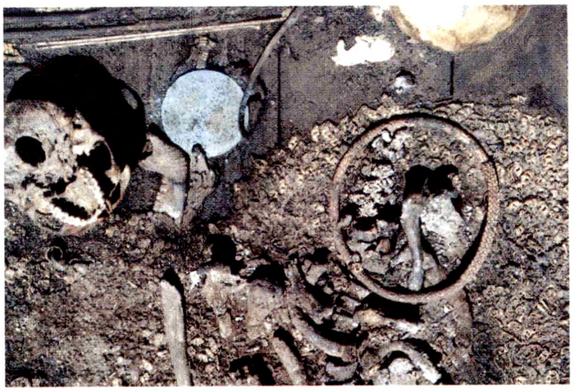

Fig. 14. Torque lying on skeleton 1.
Arzhan-2 kurgan, grave 5.

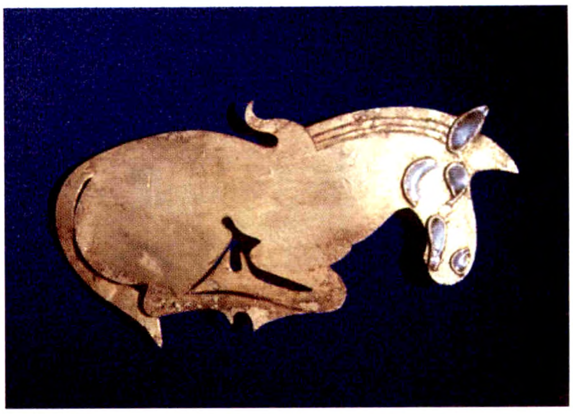

Fig. 15. Horse figurines from the male's headgear.
Arzhan-2 kurgan, grave 5.

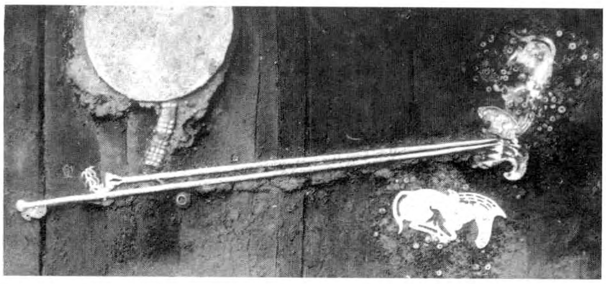

Fig. 16. Details of the male's and female's headgears. Arzhan-2 kurgan, grave 5.

have also been suspended on the northwestern wall of the chamber. Golden and silver rings (*vorvorka*) and clips found near the combs suggest that they could have belonged to belts that were not preserved. Therefore, many grave goods found in the chamber originally hung on the walls. An exception could be made for bronze mirrors that were lying to the right of the skulls with their decorated sides upwards. The rest of the finds were personal adornments of the deceased, elements of their clothes, weapons, amulets, or decorations formerly fastened to pieces of clothing or belts.

Articles found near skeleton 1

A massive cast golden torque was found near cervical vertebrae of the male skeleton (Fig. 14). The torque has a rectangular section in the center; miniature feline figures are soldered on its front side (in four rows each having twenty-two figures) and the upper edge (in two rows of twenty-two figures each). A wire with a round cross section that embraced the neck was completely covered with images of animals organized in a spiral pattern.

There was a golden earring with a soldered conical tip encrusted with gold near the first cervical vertebra. Strings of turquoise beads* tipped with golden circles 1.5 cm in diameter were threaded through the conical tip of the earring.

Fragments of headdress decorations (four large plaques depicting horses with bent legs (Fig. 15, 16), and a pommel in the form of a deer standing "on the tiptoe" of its hoofs) were found under the skull. The decorations were cut from a golden sheet, and the eyes, mouths, nostrils, cheekbones, and ears of the animals were encrusted with a glassy-like substance. Golden and turquoise beads and a cast plaque depicting a feline, analogous to the plaques decorating the costume worn by the deceased, were found among the plaques.

The other finds that did not belong to the costume described below were located near the pelvic bones and thighs. Under the left femoral joint and on the right side of the left pelvic bone, two sets of various beads were found, which were probably sewn onto a bag. We managed to reconstruct the order in which the fragments of the bag were embroidered with stone (turquoise or cornelian) beads, gold beads, or wooden beads wrapped with golden foil. Among the beads, we found four gold spherical decorations encrusted with gold and enameled (?). The tabs soldered to these decorations suggest their use as pendants. The pendants were sewn onto the bag together with other beads; for this purpose, through holes were drilled in these pendants.

Behind the right thigh, there was an iron dagger (*akinak*) in a wooden sheath from which were found only traces of a wooden frame. On the dagger there was an iron knife. The knife's handle as well as the *akinak's* handle was gilded. A golden tip depicting combat between two felines and a ram terminated the sheath. A large patterned golden plaque was found nearby. A similar plaque with a clip occurred near the ricasso of the *akinak*. Both of these plaques are executed in the animal style. The straps of the sheath fastener were decorated with gold clips ornamented in the animal style. An analogous clip was found above the left pelvic bone. After the pelvic bones were removed, the clip turned out to be fastened to a strap coming out of a whetstone. The whetstone occurred under the sacrum. The strap was also decorated with four clips of golden foil. The flat rectangular whetstone was made of a soft whitish stone. Although the exact type of stone has not been determined yet, we can say that it has nothing in common with abrasive materials.

Articles found near skeleton 2

The female's headdress was mostly made of organic materials and had a complicated construction. It included beads of a green stone, plaques depicting a lying horse, a stamped plaque in the form of a feline, and an openwork stripe whose contours resembled the head of a predatory bird. Behind the skull, two gold pins were found lying parallel to one another with their points directed to the assemblage of plaques (Fig. 16). The larger pin (length 35 cm) had a semispherical tip and an openwork wing-shaped prominence. The smaller pin (length 30 cm) had a tip in the form of a standing deer. The stems of the pins, except for their points, were covered with animal images. Obviously, stamped fragments of gold foil found under the northeastern wall of the chamber also belong to the headdress. Taking this into account, we may guess at a large height for the female's headdress.

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* Hereafter the definitions of the materials are preliminary and need further analyses.

Below the skull, there were two gold earrings in the form of flat loops with soldered conical tips encrusted with gold and enameled to form a bill-like pattern. At the bases of the conical tips, there were holes made in a similar manner as the holes on the earring found near skeleton 1. Through these holes, strings of beads similar to the beads decorating the headdress were threaded. Each earring had a cylindrical gold "muff," which was encrusted and enameled. These muffs probably served for threading numerous strings of beads found on the costume. A chain made of round wire links and a string of gold bead "springs" were running through the left earring, the latter being so long that it reached the waist. A bracelet in the form of a golden spiral chain was found on the left wrist.

Near the waist, five gold clips decorated with a zigzag pattern were found on both sides from the spine. Two of them had an ornament on both sides. It can be seen that additional stripes for fastening a sheath to a belt were attached to these clips The sheath found behind the right pelvic bone contained strongly corroded iron and bronze articles, which we took as a monolith. At present, we may suppose that the sheath contained an iron dagger, knife, and a bronze awl. The baldric belt was decorated with four golden clips depicting lying mountain goats. The belt terminated in a golden plaque with animal patterns. A similar clip and a buckle were found near the lower part of the sheath.

A spot of red paint and a small leather bag lying nearby occurred on the outer side of the left femoral joint. The bag was probably a container for a makeup set. An assemblage of small and large stone and gold beads was found beside the knee joint. The lower part of this assemblage contained large spherical and drop-shaped pendants that probably decorated some bag. Here we found a model of a cauldron with a golden twisted chain used to suspend it. The model is decorated with images of a ram and a predator. Although this article was found near the man's sheath, the direction of the chain suggests that it was more probably connected with the female burial.

Clothing

Although the material of the clothing was not preserved, the fact that the clothes were abundantly decorated with golden plaques and beads makes their reconstruction feasible. However, this work has just begun, and we can outline only several principal ideas.

The male's jacket was decorated with tightly sewn cast gold plaques showing standing felines. The reverse side of each plaque had three ring-shaped loops. The plaques were of two types: those depicting figures turned to the left and those turned to the right. More than 2500 such plaques covered the skeleton in several layers. The lower layers were traced on the pelvic bones and on the sacrum, and the arms were covered with plaques up to the middle part of the forearm. The deceased probably wore a short jacket on which the plaques formed a complicated curvilinear pattern. A similar pattern was traced on the back of the jacket because of the plaques preserved *in situ* (Fig. 17, 18). The deceased wore trousers embroidered with small (1 mm in diameter) ring-shaped gold beads. The strings of beads were sewn in parallel rows running from top to bottom, which was clearly traced on the bones and on the floor under the bones from the pelvis to the feet. Between the feet, we found beads of another form – flattened gold tubes. These beads were likely to decorate the shoes. Two wide plates of sheet gold wrapping the fibula bones also belonged to the shoes (obviously, long boots, i.e., *sapogi*).

The female's clothing was decorated with a smaller number of gold plaques depicting felines. We note that all the felines were turned to the left. Unlike the cast plaques sewn onto the male's jacket, the female's plaques were stamped out of sheet gold and fastened with three loops on their reverse sides. The composition of sewn plaques resembled a flame torch, which occupied the place up to the waist. The plaques were sewn onto the jacket on the shoulders, back, and along the side seams. The arrangement of the plaques suggests a high collar. Many beads were found among the plaques on the breast: small ring-shaped and large gold beads, beads consisting of two separate halves, cylindrical turquoise and cornelian beads, and large cut amber beads. Probably, the set also included many glass beads of an asymmetrical–biconical shape, many of which fell into small pieces. There are some beads whose material has not been determined yet. In various parts of the female's clothing, mostly from its outer side, we found large drop-shaped pendants of gold, stone, or amber. Several groups including three or four cast biconical gold pendants can be distinguished in the waist part of the body. Compact sets of narrow long tubes, which were flattened after having been sewn onto the garment, were found *in situ* on the femoral bones above the knees and on the feet. These tubes were sewn vertically very closely to each other, thereby forming horizontal rows. On the feet, we found two gold strips encrusted with gold and decorated with bill-shaped encrustations of a glassy-like substance, which probably were elements of shoes.

The headdress of the men buried in the Arzhan-2 kurgan and the complicated high female wig are close to head coverings found in other parts of the Scythian

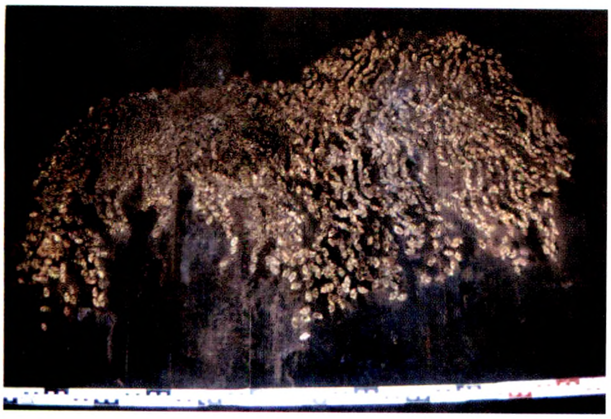

Fig. 17. Pattern of gold plaques sewn on the back of the male's and female's jackets. Arzhan-2 kurgan, grave 5.

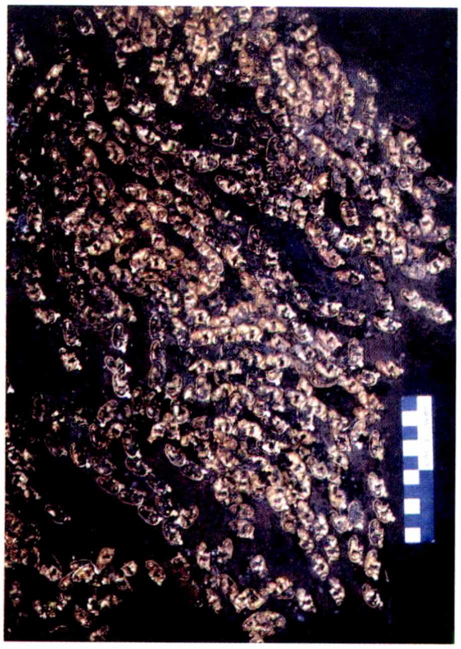

Fig. 18. Details of the male's jacket. Arzhan-2 kurgan, grave 5.

world, especially to those preserved in the "frozen" Pazyryk kurgans – Verkh-Kaldzhin-2 (kurgan 3) and Ak-Alakha-3 (kurgan 1) in the Altai studied by N.V. Polosmak and V.I. Molodin (Polosmak, 1994: 40, 43, fig. 34, 35, 38; 2001: 143 – 163, fig. 96 – 107, reconstruction III; Fenomen..., 2000: 76 – 78, fig. 75 – 77, 104 – 105, fig. 125, 163 – 164, fig. 190).

In dating grave 5 of the Arzhan-2 kurgan, many problems arise that do not permit unambiguous assignment of this complex to any known culture or cultural stage. The cultural attribution of this complex is difficult also because a site of this type has been investigated in this region for the first time. As is known, although the Arzhan kurgan excavated by M.P. Gryaznov was similar to the Arzhan-2 kurgan in appearance, their constructions differed greatly, and, hence, the chronological gap between these two sites is obvious. In addition, the detailed picture of the funerary ritual practiced at the second site has not been revealed yet and will be available only after completion of an integrated study. The location of the grave in the peripheral zone of the kurgan and the occurrence of two burials under one construction are typical of the Aldy-Bel funerary rite. On the other hand, the depth of the grave and chamber dimensions are close to the Uyuk-Saglyn tradition. However, the above noted features can be explained by the fact that the buried belonged to an elite stratum of society. The tradition of suspending a belt with a quiver for both arrows and a bow has been reported from the Uyuk-Saglyn burial grounds of Dogee-Baary II, Chinge II, and Sagly-Bazhi II but it has never been found in the kurgans of the Aldy-Bel type (Chugunov, 1996à: 87 – 89). The design of the sheath from grave 5 – with clips at the end and without additional prominences in the middle part for fastening to a thigh – is typical of an early Scythian type (Kisel, 2000: 82 – 95). In the collection from the Arzhan-2 kurgan there are no articles typical of the ordinary graves of the Uyuk-Saglyn kurgans, such as baldric clips with holes for stripes and "quiver hooks." The absence of ceramics is a characteristic feature of the Aldy-Bel funerary rite. Horn vessels have been reported from the Pazyryk kurgans of the Altai (Fenomen..., 2000: 144 – 157).

Among numerous animals depicted on the articles and clothing, there are no griffins or other fantastic creatures. The fact that the depicted animals are only real ungulates or predators is typical of the Early Scythian tradition. A classical example of the Early Scythian artistic style is an image of a deer standing on "the tiptoe" of its hoofs on the pommel of the male's headdress. However, this headdress was decorated with plaques showing horses with bent legs. This posture is traditionally believed to exist in the later periods. The wild boar and the predator are shown in the "Bashadar–Pazyryk" manner, which was also used for some motifs on the pectoral as well as for images of rams and a predator on the model of a cauldron and for the image of a mountain goat. The large patterned plaques found near the *akinak* sheath beside skeleton 1 are executed in a manner similar to the "puzzling picture" style characteristic of the Aldy-Bel Culture (Grach, 1980: 78 – 80). The large plaque with birds' profiles found near the quiver also have analogs among the materials of this culture. Similar articles depicting camels' profiles are known to come from tomb 2 of kurgan 4 of the Sypuchii Yar burial site (Semenov, 2001: 167, fig. 3, 13, 14).

The form of the torque found near the vertebrae of the male skeleton is similar to that of a torque (without animal images) from the Siberian Collection of Peter the Great (Rudenko, 1962: plate XIV, *1*). A similar torque was found in Pattan (Pakistan) but, unfortunately, it became known to archaeologists only in fragments (Rahaman, 1990: 5 – 17, plates II – XV). Having compared the Pakistani torque with the Siberian find, K. Jettmar recostructed this torque (1991: 10 – 15, fig. 17, 18, 20 – 22). The Pakistani torque has a rod-shaped prominence with a rectangular cross section, and it is fully covered with animal images, similar in style to the images on the torque from grave 5. Unlike the Tyvinian torque, the Pakistani torque is larger in size and has human images.

The composite belt has direct analogs among the objects of the Aldy-Bel complexes in Tyva. Analogous clips, though made of bronze, were found in tomb 1 of kurgan 1 of the Demir-Sug II burial site (Semenov, 2001: fig. 2 – 13). A baldric for a quiver analogous to that found in Arzhan-2 was found at the Sypuchii Yar burial site. Both sites are considered the earliest among the Aldy-Bel burial sites (Savinov, 1994: 84; Semenov, 2001: 170).

Round stone altars (sacrificial articles) were widely spread in the Asian part of the Scythian world. Three specimens are reported from Tyva, but their style is not so elaborate and their dimensions are different (Marsadolov, 1998: 59, fig. 4 – 7; Bokovenko, 1994: fig. 3, *2*; Chugunov, 1996b: 73, fig. 2, *2*). Analogs to the stone bill-shaped vessel, which are dated to the middle of the 6th century BC at the latest, are reported from the Lake Aral region (Vishnevskaya, 1973: 87, plate XXIV, *4*, *5*; Yablonskii, 1996: 34, fig. 21, *9*; Itina, Yablonskii, 1997: 42, fig. 22, *6*; 55, *10*; 65, *7*), and from North Kazakhstan (Khabdullina, 1994: 60, plate 58, *3*).

Fragments of a scourge analogous to that found in Arzhan-2 were found in the kurgans of Uigarak and South Tagisken (Vishnevskaya, 1973: plate VII, *19*, *20*; XIV, *12*; XIX, *10*, *11*, Itina, Yablonskii, 1997: 52, *8*, *10*).

The pectorals similar to that found in the corner of grave 5 in Arzhan-2 are often found in female burials in the late Aldy-Bel sites (Čugunov, 1998: Abb. 4, *8*; 7, *1*). However, these pectorals are known to originate from the Early Uyuk-Saglyn complexes of Kuilug-Khem III, Khemchik-Bom IV, Dogee-Baary II (Grach, 1980: fig. 112, *7*; Chugunov, 1999: 39). Earrings with soldered conical tips are also typical of the Aldy-Bel sites (Semenov, 1999: 165 – 169).

Weapons are highly informative cultural and chronological indicators. Several iron weapons were found in tombs dating as far back as the ordinary Aldy-Bel tombs in Tyva (Semenov, Kilunovskaya, 1990: fig. 2, *33*; Čugunov, 1998: 290, Abb. 13, *1*). A greater number of iron weapons, often decorated with a golden inlaid pattern, come from early Uyuk-Saglyn sites (Semenov, 1994: 185 – 189). All weapons found in grave 5 of the Arzhan-2 kurgan are made of iron. Since the metal is strongly corroded, it is difficult to determine the form prior to their restoration; therefore, we believe that it is too early to date the complex using these articles.

The number of artifacts recovered in the burial totaled 9,000 specimens Soil and organic remains were sampled for palynological analysis, and cross sections of roof logs were taken for dendrochronological and radiocarbon studies. Specialists have already started working with these materials. The Arzhan-2 finds are being studied in restoration and scientific laboratories of the State Hermitage, St. Petersburg. After completion of all studies, including archaeological excavations of the site, the authors plan to publish a monograph. In this paper, we would like to share only preliminary ideas concerning this remarkable burial complex.

Conclusion

In conclusion, we would like to note several features concerning the preliminary publication of the materials from grave 5 of the Arzhan-2 kurgan.

This is a unique *in situ* complex because intact burials of nobility dating to the epoch of Early Nomads have never been found in Tyva as well as the rest of Siberia.

This complex can be compared with rich burials of the Pazyryk Culture.

The objects found suggest intercultural contacts with more western regions of the Scythian world.

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Appendix

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Plant remains in the Arzhan-2 kurgan (Tyva)

In 2001, archaeologists found remains of plants among the objects of material culture in a burial chamber of a kurgan of the Scythian period in Tyva. The state of preservation of these fossils allowed identification of the samples* with accuracy at least to a genus. The identification of plants used in funeral practices provides additional information on cultural contacts and migrations of the Tyva population in the Scythian period.

The plant remains found in one of the corners of the burial chamber were identified with great certainty as caraway mericarps (*Carum sp.*) (fruitlet), cherry stones or fruits (*Cerasus sp.*), and oleaster exocarps (external coats of fruits) (*Eleagnus sp.*) (see Figure)

Caraway – *Carum sp.* (*Apiaceae* family).

The caraway mericarps were black, homogeneous, well preserved, and were easily identified

Plants of this genus are widely spread throughout Asia and Europe (Shishkin, 1950; Pimenov, 1996). These are biennial herbs. In Tyva, there are two close species of the caraway (Krasnoborov, 1982), one of which – *C. carvi* L. – is a plant usual for grassland, coastal, and disturbed habitat areas.

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* The plant samples for identification were kindly provided by K.V. Chugunov.

Caraway seeds have been used as a spice since ancient times.

Cherry – *Cerasus sp*. (*Rosaceae* family).

Although the form and size of cherry stones found in the burial did not change with time, their color turned dark brown. On some stones, one can still see the remains of a pericarp. Obviously, it was not cherry stones but dried fruits that were laid into the burial. Some stones have dehydrated seeds inside.

Geographically, cherries are widely spread: various species grow in the East, Central, and Southwest Asia, as well as in the Caucasus, Europe, and North America (Zhukovskii, 1971). It is of interest that wild cherry does not grow either in the mountains of South Siberia, including Tyva, or in Mongolia (Kurbatskii, 1988; Gubanov, 1996). The cherry habitat closest to Tyva is the south of the Kurgan, Omsk, and Tobolsk Provinces, and the north of Kazakhstan (the Irtysh floristic region) where the shrubby cherry (*Cerasus fruticosa* Pall.) grows (Goloskokov, 1961). The shrubby cherry grows on small bushes on the borders of wood and in sparse small-leaved forests as underbrush.

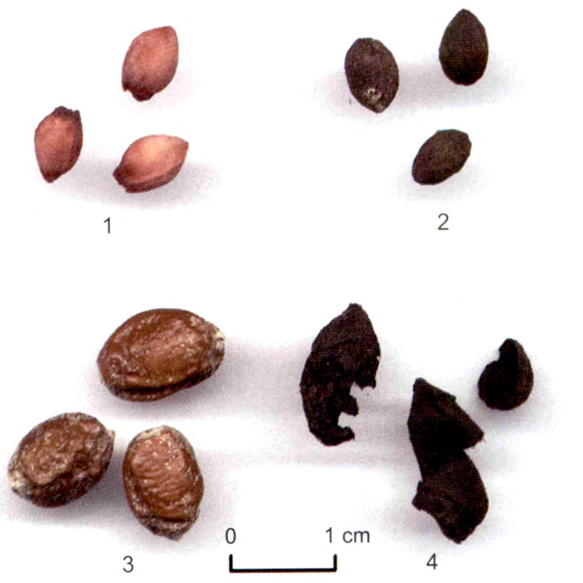
Cherry has been cultivated since ancient times. Cherry fruits are edible; they can also be used as a gum or "cherry glue," and the cherry bark is used as a hardener.

Oleaster – *Elaeagnus sp*. (*Elaeagnaceae* family).

Among the plants found in the burial, the exocarps of oleaster were the most difficult to identify because, we do not know the plants growing in western Central Asia well, and these remains were preserved in a much poorer condition than the cherry stones or caraway seeds.

The samples specified as oleaster exocarps were fragile, with delicate skins of black color. Oleaster berries have large elliptic stones with massive endocarps. However, our samples did not have stones, which was obviously caused by insects (on the exocarps, one can clearly see small round holes).

The members of this species are mainly spread in the moderate latitudes of Asia and the Mediterranean. Oleaster species do not growth in the mountains of South Siberia, including the Tyva region, but they were reported from the adjacent plains of the Altai (Zuev, 1996) and Kazakhstan (Goloskokov, 1963) and from South Mongolia (Gubanov, 1996). The representatives of this genus are short trees and bushes usual for river plains. P.M. Zhukovskii (1971) notes that the oleaster in western Central Asia has a long history. Dry oleaster berries with high sugar content preserve well, and are very convenient for transportation. In the times of caravan communication, they were used in western and eastern Central Asia as important provisions that were as significant as dates in Arabia and North Africa. An alcoholic beverage was also made of oleaster fruits.



Steppe cherry stones (*1*), cherry stones from the burial (*2*), Eastern oleaster berries (*3*), and remains of oleaster berries from the burial (*4*).

In conclusion, we note that the discovery of samples of plants that presently do not grow in Tyva, and probably never grew there, indicate the western direction of cultural contacts of the Tyva population in Scythian times because these plants are most typical of western Central Asia.

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THE "SAVROMATIANS" IN THE ALTAI

Introduction

The territory of the middle Ursula River (Central Altai) has always attracted particular attention of Russian archaeologists. A number of well-known scholars such as V.V. Radlov, S.I. Rudenko, M.P. Gryaznov, S.V. Kiselev, A.P. Okladnikov, A.I. Martynov, and many others have worked in this district. Their discoveries and publications are known worldwide, and the unique artifacts found in the "frozen" barrows are deposited and exhibited in the most famous Russian museums. At this time, scientific interest in the archaeological sites located in the Ursula River basin is growing. In this district, several ancient sites and a Stone Age workshop were found. The discovery of Chalcolithic burials in stone cists with mural polychrome paintings was a sensation for the Altai region. Along the Ursula River and its numerous tributaries, archaeologists are still finding unknown runic inscriptions, rock images, burial mounds, and stone figurines of different epochs.

The migration of ancient nomads from the South Ural region to the Altai is a very important problem in modern archaeology, and the solution of this problem depends largely on the prompt publication of new archaeological materials. These migrants, probably small groups of Savromatians or Sarmatians, penetrated into the Ob–Irtysh steppe and forest-steppe interfluve in the 5th – 4th centuries BC. V.A. Mogilnikov believes that the Savromatian–Sarmatian invasion lasted a short time and included only the northern part of Kulunda to the city of Kamen-na-Obi (1999: 137). Archaeologically, this is supported by the appearance of the so-called "diagonal" burials and, partly, by the appearance of niche graves, which were unusual for "... the cultures of the steppe-forest of West Siberia and the steppe of Kazakhstan. These graves are also unknown in the Sayano-Altai Mountains and to the east of the Ob River" (Mogilnikov, 1993: 193). However, this conclusion turned out to be premature. Two burial mounds (kurgans) that can be undoubtedly classified as diagonal graves have been discovered in the territory of the Republic of Altai for the first time.

Description of the kurgans

In 1985 – 1986, the East Altai team of the North Asian Complex Expedition of the Institute of Archaeology and Ethnography, SB RAS, excavated a large group of burial mounds in the Altai (Kubarev, 1987: 250 – 251). This burial site is located in the Kurota River estuary (an eastern tributary of the Ursula River) in the foothills of a mountain ridge (Fig. 1). The complex included approximately 50 various stone funerary and post-funerary constructions. At present, the site is surrounded by plowed fields on the east and west, and to the south it is limited by the Chuya Highway (628 km from Novosibirsk), the main traffic artery between Russia and Mongolia (Fig. 2). Local people call this place Balyk-Sook. Previously, several burial mounds and ancient Turkic ritual constructions with one stone figurine were excavated (Surazakov, 1990: 68; Kubarev, Kocheev, 1988: plate VII, *13*). In this area, S.V. Kiselev studied sites of the Afanasievo Culture located on the left bank of the Kurota River (1951: 530).

Most of the kurgans are grouped in two large burial grounds, named by the present author Balyk-Sook I (14 objects) and Balyk-Sook II (34 objects). During

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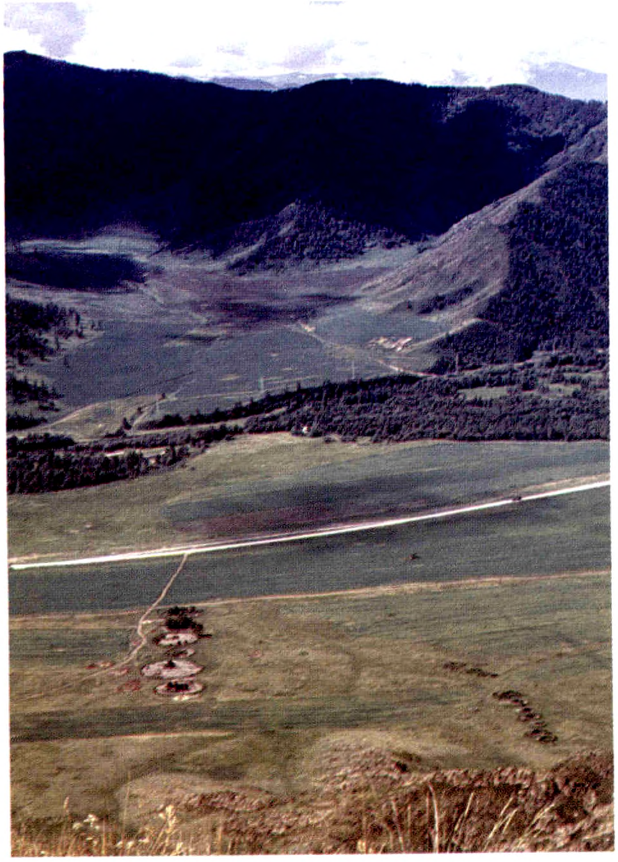

Fig. 1. Balyk-Sook burial ground (northern view).

two field seasons, we excavated 15 kurgans (see Fig. 2) attributed to various historical epochs: from the Early Iron Age to the medieval period. However, diagonal burials unusual for the Altai found inside kurgans 21 and 27 are of particular interest. We will describe in detail these burial mounds and the grave goods excavated.

Kurgan 21. In the central part of a round mound 15 m in diameter, an extensive turfed hollow (8 – 10 m in diameter) resulting from the sinking of the tomb can be seen. Small pebbles and crushed stones forming an annular bank were located only on the outer side of the cairn (Fig. 3). After the cairn was removed (the height above the modern surface did not exceed 25 – 30 cm), a circular grave pit 5 m in diameter was seen in the center of the tomb (Fig. 4). The upper part of the grave pit was filled with pure humus without any inclusions. At a depth of 120 – 140 cm, several large stones appeared in the center of the grave pit, and continued until we reached the grave bottom. During the removal of the soil, we could identify more clearly an ancient entrance made by pillagers 1.5 – 2 m in diameter: this entrance was filled with black humus, stones, bones of various animals, and charcoals, distinguishing it from the yellow clay of the grave filling.

At a depth of 385 cm in the southern part of the grave pit, a small dog's skeleton was found with its head pointing south (Fig. 5). By the northern wall, at a depth of 495 cm, a female skull was revealed*; at the same level as the skull, vertebrae and ribs were scattered over the entire grave area. Fragments of a crushed ceramic vessel were found almost in the center of the grave scattered at different levels (from 530 to 600 cm) and large distances from each other (see Fig. 4, *1*). The vessel was reconstructed (Fig. 6). In the northern part of the pillagers' entrance, on the pit bottom (650 cm in depth), a broken iron hair-pin covered with sheet gold (see Fig. 4, *2*) and a small round plaque with two holes made of thick sheet gold (see Fig. 4, *3*) were found. Near the northwestern wall (at a distance of 120 cm from it), four small glass beads (see Fig. 4, *4*) and pieces of iron (see Fig. 4, *5*) were found lying on the pit bottom.

A wooden chamber – or to be more precise, its traces – were found at a depth of 600 cm. Rare fragments of wood and typical cavities – imprints of rotted wooden poles in the grave soil – suggest that a 380 × 400 × 50 cm chamber was constructed of thin poles (5 – 7 cm in diameter). The floor was paved with very thin wooden boards (1.5 – 2 cm thick) that were traced only by black rot. However, the direction of impressed wooden fibers suggests that the boards were laid from north to south, i.e., diagonally to the direction of chamber poles (see Fig. 4). Under the floor, on the pit bottom made of flattened and rammed layers of clay 2 – 4 cm thick, traces of rotted poles 5 – 7 cm in diameter placed at an acute angle to each other were found. These poles underlay the floor pavement. The pit depth was 650 cm.

Kurgan 27. The mound was hardly recognizable on the modern surface. It was constructed of small stones brought to this place from the foot of the mountains located to the north of the cemetery. Because of the bowl-shaped turfed hollow in the center of the barrow, the mound had the form of a turfed stone ring 14 – 15 m in diameter (Fig. 7). Initially the height of the fence was 0.5 m or more; after the turf was removed, the cairn had the form of a fence 1 m thick. The fence was built of stones and stood on a gravel bed. The grave was filled with materials of different kinds (humus, large and small stones); it contained animal bones (sheep, horse, etc.)** and charcoal.

The excavations of the tomb revealed that the grave pit in its upper part coincided with the round form of the central surface hollow, gradually narrowing downwards. Thus, the grave pit size on the

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* Identifications were performed by T.A. Chikisheva, a physical anthropologist.

**Identification performed by N.D. Ovodov, a paleontologist.

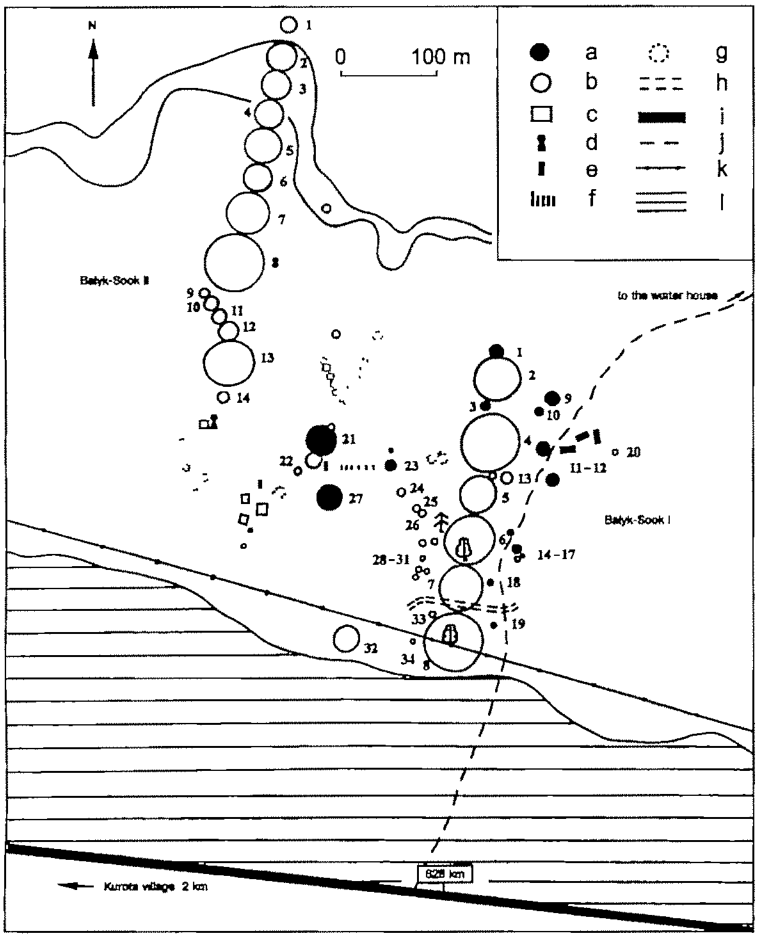

Fig 2 Plan of archaeological objects in the locality of Balyk-Sook.
a – excavated barrows, *b* – unexplored objects, *c* – Ancient Turkic memorial enclosures, *d* – stone figurine, *e* – stone steles, *f* – *balbals* (vertical stone slabs), *g* – memorial constructions, *h* – traces of an ancient irrigation canal; *i* – Chuya Highway, *j* – field road to the winter house: *k* – telephone line, *l* – plowed field

surface was 520 × 400 cm, and at a depth of 120 cm, it was 350 × 280 cm. The pit configuration also changed, being transformed into a rectangle (Fig. 8). The long axis of the pit was east – west oriented. At a depth of 215 – 250 cm, several large blocks were found at the bottom part of the humus and stone fill of the pit. Beneath the blocks, clay with rock debris occurred. At a depth of 340 – 360 cm, fragments of wooden logs were found, which probably covered the grave in the longitudinal direction

At 410 – 415 cm, in the southwestern corner of the pit, fragments of a human skeleton were found (several vertebrae and ribs lying in anatomical order). Round hollow imprints of rotted poles in clay walls allowed us to reconstruct a rectangular funeral chamber with the size of 350 × 380 × 120 cm. Obviously, it was a wooden log-chamber with 7 – 8 rows of overlapping poles placed near the pit walls and oriented with its sides to the four cardinal points. A roof made of larch planks lying diagonally was identified only by the wooden rot. The chamber floor of thin boards (at a depth of 450 cm) was also poorly preserved. The imprints of these boards showed that they were also placed diagonally with respect to the pit and the chamber (see Fig. 8). Under the chamber flow, on the pit bottom, several (5 – 6) stumps of poles 3 – 4 cm thick were found.

Inside the chamber, at various depths (430 – 460 cm), two fragmented human skeletons were uncovered. We failed to reconstruct their initial position and orientation. Undoubtedly, only a crushed ceramic vessel (see Fig. 8, *1*; 9) near the northern wall of the chamber and several caudal vertebrae of a sheep with an iron knife in the central part of the pit (see Fig. 8, *2*; 10) occurred *in situ*. A horse sacrum and a fragment of a second iron knife were also found nearby (see Fig. 8, 2).

A man and a woman were buried in this chamber. The upper part of the male skeleton (preserved in anatomical order) was found near the southeastern corner of the chamber. Three bronze arrowheads were found together to the right of the man (see Fig. 8, *3*; 11). A silver belt clip (Fig. 12) was found separately, near the eastern wall of the chamber (see Fig. 8, *4*).

The female burial, which also was disturbed, occurred in the western part of the pit. Probably, the buried woman lay with her head to the northwest. A bronze mirror (see Fig. 8, *5*) with an engraved back surface (Fig. 13), a golden earring with a pendant in the form of an arrowhead, and a golden hollow figurine depicting a feline (see Fig. 8, *6*, *7*; 14) were found under the female skull. To the left of the skull, there were two horn arrowheads (see Fig. 8, *9*; 15); to the right of the skull, there was golden foil that once covered a wooden plaque (see Fig. 8, *9*; 15). Another horn arrowhead in the shape of a bullet was found among the human bones near the southern wall of the chamber (see Fig. 8, *11*; 11). Near the arrowhead, a golden cover of a necklace terminal (see Fig. 8, *10*; 16), small fragments of thin golden foil, as well as an iron hook from a quiver and several iron clips were found (see Fig. 8, *12*).

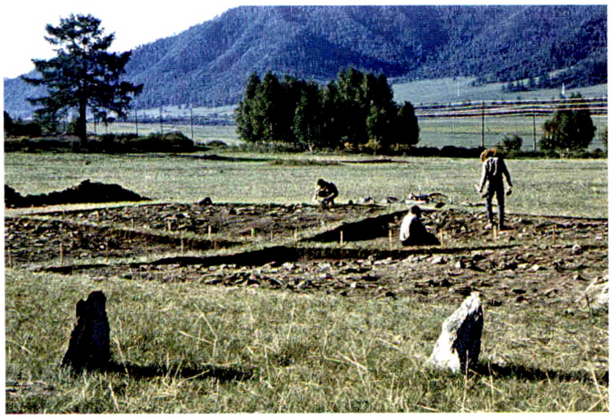

Fig. 3. Kurgan 21 of the Balyk-Sook I burial ground (northwestern view).

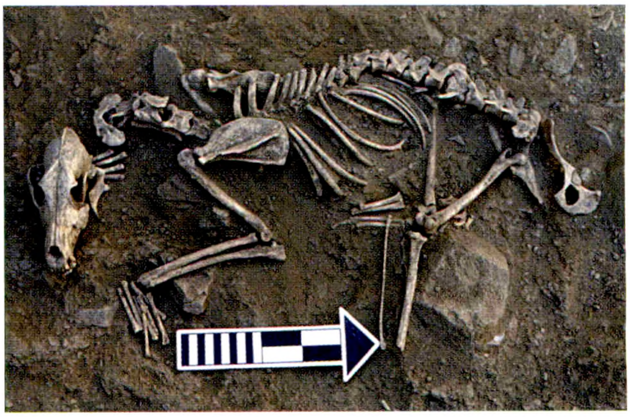

Fig. 5. Dog skeleton in the filling of kurgan 21 of the Balyk-Sook I burial ground.

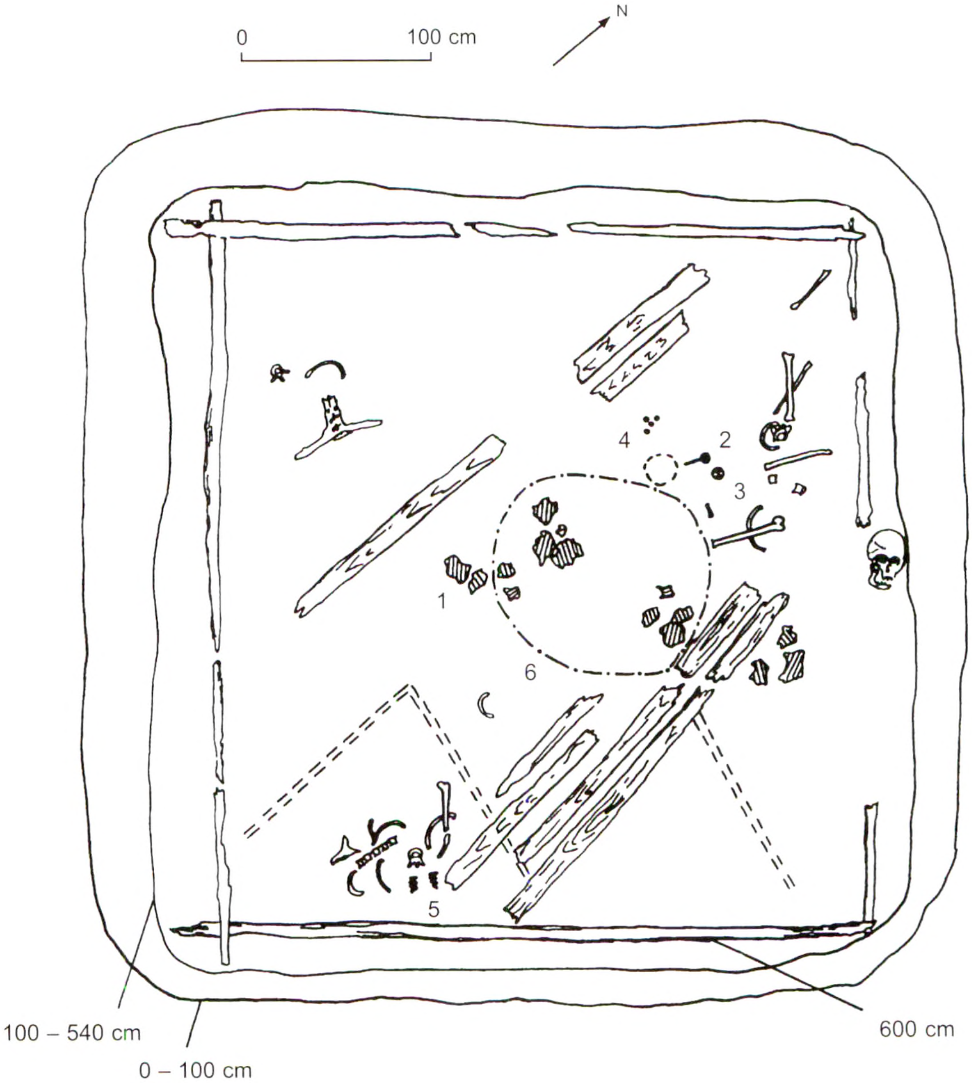

Fig. 4. Plan of a grave in kurgan 21 of the Balyk-Sook I burial ground.
1 – fragments of a ceramic vessel; *2* – iron hair-pin covered with sheet gold; *3* – golden plaque with holes in the center; *4* – glass beads; *5* – iron fragments; *6* – contours of pillagers' entrance.

Funerary ritual and grave goods

The funerary ritual reconstructed on the evidence found in the two barrows of Balyk-Sook differs greatly from the traditional burial practice of the Pazyryk population of the Altai in the Scythian time. Judging from all the Balyk-Sook kurgan characteristics (annular stone cairns, large rectangular grave pits over 6 m in depth, the use of fire during the funerary ceremony, the diagonal position of the deceased in the chamber and their north or north-west orientation, rich funeral feast, a specific set of grave goods, and some other less significant features), these barrows should be attributed to the so-called diagonal burials. In the archaeological literature, this term designates burials with the unusual diagonal position of the deceased. "Diagonal burials are the most typical and common feature of all Sarmatians" (Smirnov, 1984: 122). Hypotheses concerning the origin and ethnic attribution of diagonal burials are outside the scope of this paper. They have been described in the archeological literature in enough detail (Smirnov, 1964: 93 – 94; 1984: 9 – 18, 122 – 123; Maksimov, 1966: 98 – 115; Moshkova, 1972: 70 – 71; Shilov, 1975: 135; Mogilnikov, 1993: 189 – 193; 1997: 104; etc.). Many of the hypotheses, although debatable, were analyzed by I.P. Zasetskaya (1974: 121), who came to a conclusion about the wide area of distribution of the graves with diagonal position of skeletons. According to her, this rather strange ritual existed among different peoples and tribes, reflecting certain social phenomena or even religious beliefs of ancient societies.

Let's consider several of the most typical characteristics of the funerary rite existing among the Balyk-Sook population and perform a comparative-typological analysis of grave goods found in the barrows. Burial structures of both kurgans are very similar in cairn sizes and depths of grave pits. It should be noted that every barrow has one central grave (the Pazyryk tradition), but accompanying horse burials were absent. However, horse bones were found not only in the chamber (remains of the so-called 'farewell feast'), but also in the grave fillings (traces of a 'funeral feast'). This practice was unknown to the Pazyryk people in the Altai. A common element of burial ritual among the Iranian-speaking nomads of the Altai and adjacent territories was the use of a 'purifying' fire, evidenced by charcoals found in the Balyk-Sook barrows. A longitudinal roofing of the grave pit in kurgan 27 is typical only of some of the Pazyryk barrows in the Altai and of the nomads in the Altai piedmonts. The Balyk-Sook burial chambers constructed of thin poles are similar in size and rectangular shape to the Pazyryk burial chambers. We also note the typical Pazyryk custom of placing a ceramic vessel, a wooden dish, an iron knife, and the fat-tail part of a sheep in the graves near the head of the deceased. The Balyk-Sook people conformed to this rule, too. Supposedly, the deceased in the Balyk-Sook barrows were oriented with their heads to the north or northwest. Such position of bodies was unusual not only for the Pazyryk people (in most cases they lie with heads oriented to the east), but also for their western neighbors, the Saka and the Wusun, who preferred a western orientation.

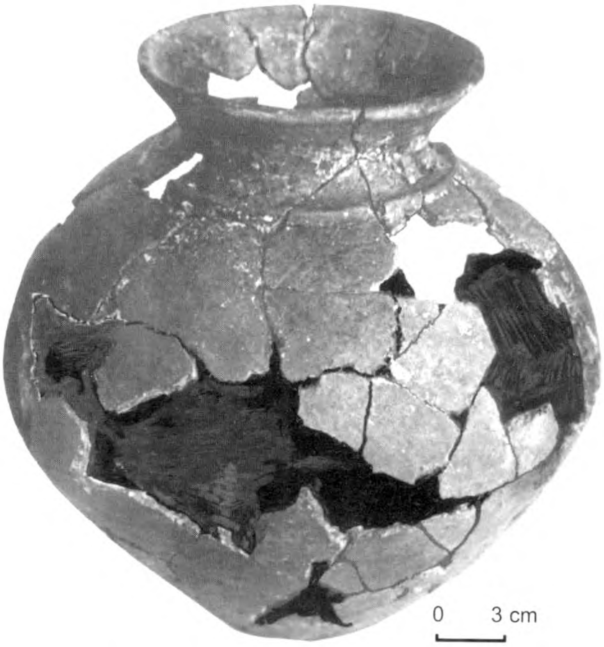

Fig. 6. Reconstructed ceramic vessel from kurgan 21 of the Balyk-Sook I burial ground.

Certain similarities between the Balyk-Sook and Pazyryk funerary rituals can be explained by direct contacts of migrants with the Pazyryk Culture bearers of the Altai.

A dog burial (see Fig. 5) in the pit of kurgan 21 located 1 m above the female burial was obviously the final element in the cycle of ceremonies associated with the funeral rite. The fairly good condition of the dog's skeleton was due to the fact that the pillagers did not disturb it. Ancient burials of dogs are rarely found in the Altai region. In more than 150 burial complexes of early nomads in the Eastern Altai, only one dog (belonging to a 'Mongol breed') burial has been found (Kubarev, 1991: 166 – 167). In the Scytho-Siberian burial complexes from neighboring territories, dog skeletons were also rarely found (Abetekov, 1978: 59 – 65; Kuznetsov, 1998: 299 – 307; Kuznetsov, Hudiakov, 1998: 308 – 315; etc.). Several dogs buried in one grave with people are known among the Early Sarmatian nomadic tribes of

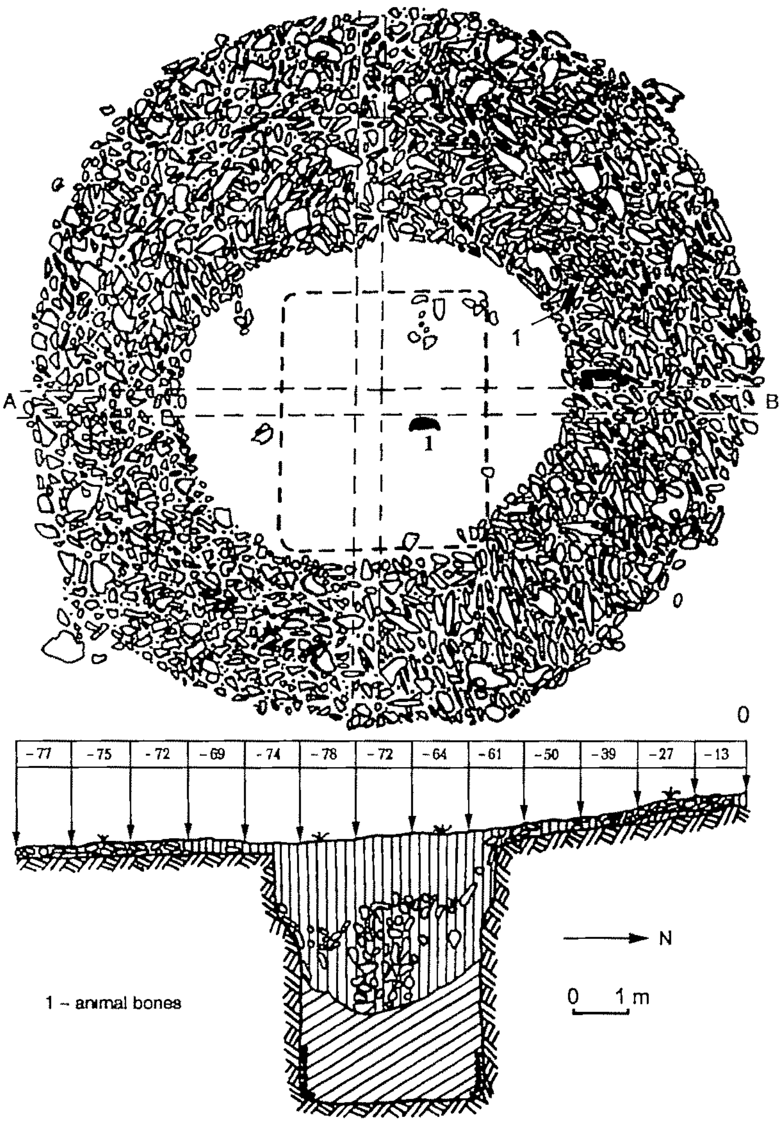

Fig 7. Plan of kurgan 27 and the mound cross-section along the A – B line. Balyk-Sook I burial ground

the Lower Volga region (Shilov, 1975: 115). However, the very important role of dogs in the traditional economy of ancient hunters and cattle-breeders is widely known. For example, paleozoological evidence from the Xiong-nu Ivolga fortified settlement shows that dogs prevailed among other domestic animals. The dogs were of three breeds: husky, a large wolf-like dog, and mastiff (Davydova, 1995: 47). In Siberia, the earliest dog burials are attributed to the Mesolithic and Chalcolithic epochs (Kosarev, 1988: 98 – 102; Novikov, 2001: 72 – 83). Skeletons of killed dogs were found in the Andronovo culture burial complexes (Mikhaylov, 1992: 110 – 116). Petroglyphic images from Mongolia and the Altai show that as early as the 2nd – 1st millennia BC large ungulate animals were hunted with dogs. Hunters trailed their prey with a specially trained dog (as a rule, it is depicted fastened to a man's belt) or even with a pack of dogs (up to 30) (Kubarev, 2001: fig. 1). However, we may only guess at the 'participation' of dogs in myth and ritual practices or their use as a sacrificial animal in various ceremonies of the life cycle of the ancient Altai population (Kubarev, Cheremisin, 1987: 112 – 113). New archeological data are necessary to advance our understanding of the place and role of dogs in the ideological system of ancient nomads of the Altai.

Ceramic materials are often used for the chronological attribution of burial complexes. However, the two reconstructed vessels from Balyk-Sook differ greatly from the traditional forms of ceramics of the Scythian period in the Altai.

A ceramic jar with a biconical body and a short deflected rim (see Fig. 6) is a rare find for Gorny Altai because it has no analogs among ceramic vessels from the graves of the Pazyryk Culture. On the one hand, its form is similar to the form of polished Savromatian vessels (Smirnov, 1964: 352, fig. 60, *1*, 2); on the other hand, it is analogous to some vessels from the Xiong-nu kilns found on the Yustyd River (Kubarev, Zhuravleva, 1986: 112, fig. 5, 2). Therefore, it is difficult to estimate more precisely the age of the ceramic vessel found in kurgan 21.

A ceramic barrel-shaped vessel (36 × 32 cm) with a short neck (see Fig. 9) was found for the first time in the archaeological complexes of Gorny Altai. The closest analogs are stone barrels found in the materials of the Kamenskaya Culture of the steppe-forest regions of the Upper Ob River basin, attributed to the Scythian period (4th – 2nd centuries BC) (Mogilnikov, Umanskiy, 1992: 200, fig. 2, *11*; Umanskiy, 1993: 87, fig. 2, *4*; Frolov, Shamshin, 1999: fig. 2, *11*). A.P. Umanskiy (1987: 36 – 37, fig. 1, *1*) believes that these ceramic barrels are similar to the Tashtyk ceramic vessels of this kind and to the barrel-shaped flasks of the Dzhetyasarskaya culture in western Central Asia. Miniature barrel-shaped

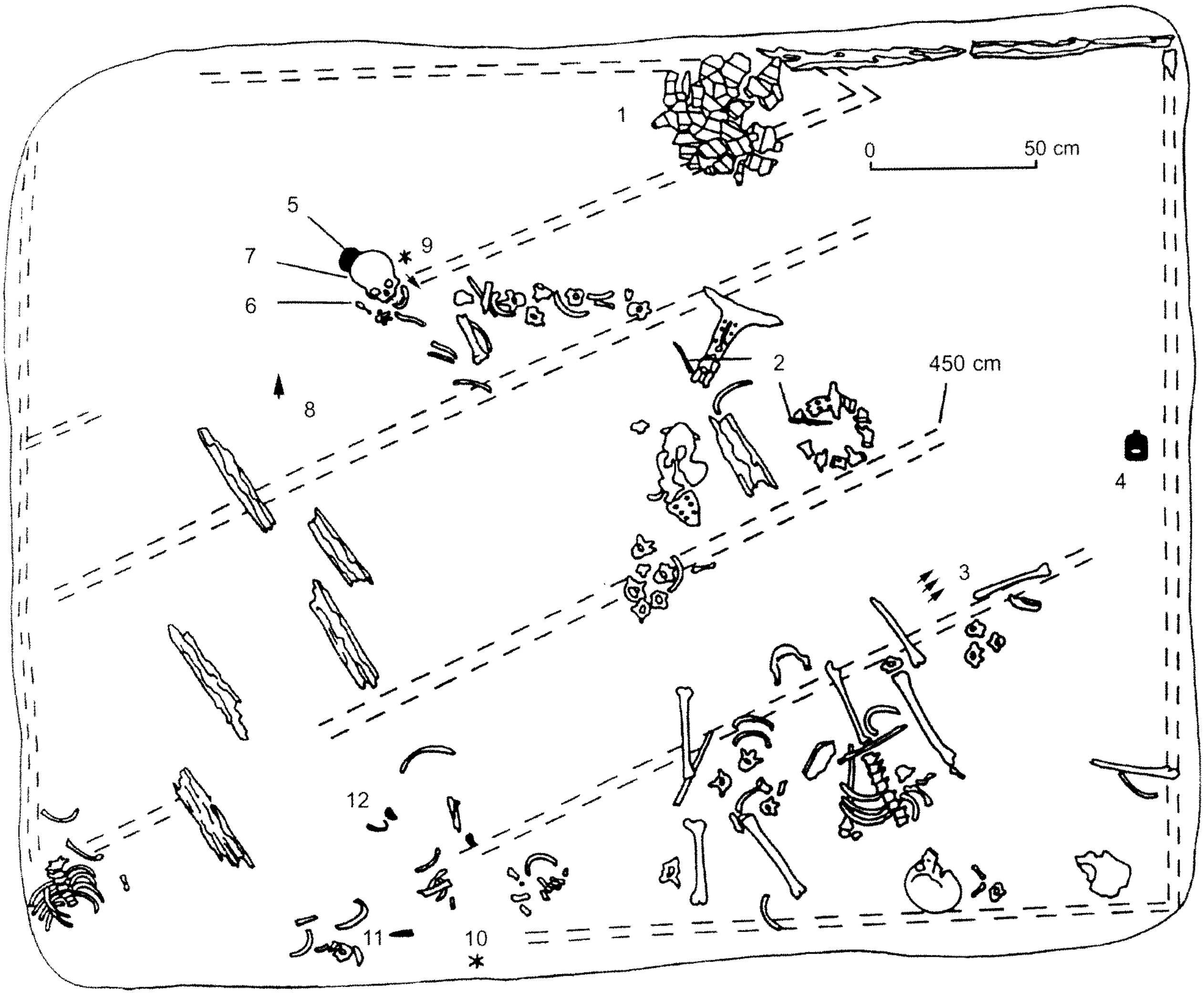

Fig. 8. Plan of a grave in kurgan 27 of the Balyk-Sook I burial ground.
1 – fragments of a ceramic vessel; *2* – iron knives; *3* – bronze arrowheads; *4* – silver belt plaque; *5* – bronze mirror; *6* – golden earring; *7* – pendant depicting a leopard (?); *8* – horn arrowheads; *9* – golden foil covering a patterned clip; *10* – golden foil covering a necklace terminal depicting a leopard; *11* – horn arrowhead; *12* – hook from a quiver and belt plaques.

vessels of another form were found in the burial complexes of the Kulai and Bolsherechenskaya cultures (3rd – 2nd centuries BC) in the Novosibirsk Ob region (Troitskaya, 1979: plate XXI, *16*; Troitskaya, Borodovskiy, 1994: plate XXXIX, *18*). Archaeologists believe that this rare type of vessel was brought from southern and southeastern regions of Siberia since many such vessels were found in the burials of the Early Tashtyk epoch in Khakassiya and in the Hunno-Sarmatian complexes in Tyva (Kyzlasov, 1960: plate 4, *72*; Vadetskaya, 1999: fig. 22, *15*, plate 51; Wainstein, 1970: fig. 80, *9*; 82, *2*; Dyakonova, 1970: plate VII, *16*, *17*, *19*, *26*). However, Mogilnikov did not support this idea because the Tyva and Minisinsk barrel-shaped vessels are dated to a much later period (2nd century BC – 2nd century AD) than the ceramic vessels of this form from the Upper Ob region (1997: 34 – 35). In addition, the vessels from Khakassiya and Tyva are largely made of wood, the middle part has a hole plugged with a cork, and two thick rims decorate the sides of these barrels. Some archaeologists believe that these arcs imitate thick seams, and the ceramic barrels are modeled after water-skins, similar to the *tashaurs* used by modern Altaians (see (Umanskiy, 1987: 37; Mogilnikov, 1997: 35)). We suppose that these thick rims were practically used for better pouring liquid from the barrel (water, *koumiss* – fermented mare's milk, milk vodka, etc.). Obviously, these seams were on large, real barrels used in nomadic everyday life, which is shown by the fact that such rims are preserved on traditional wooden barrels used by the Khakassians and

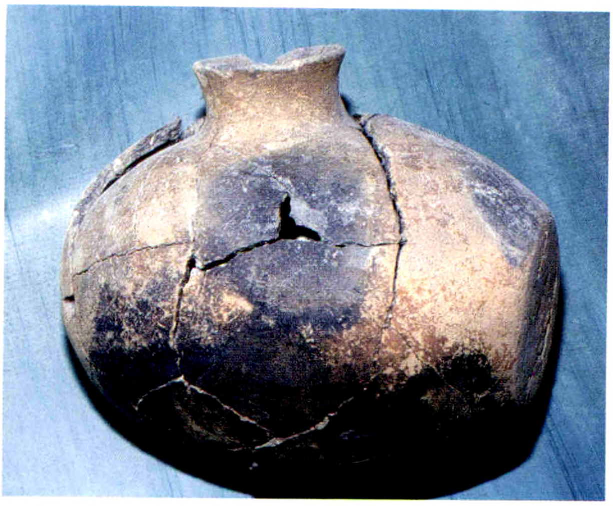

Fig. 9. Reconstructed ceramic barrel-shaped vessel from Kurgan 27 of the Balyk-Sook I burial ground.

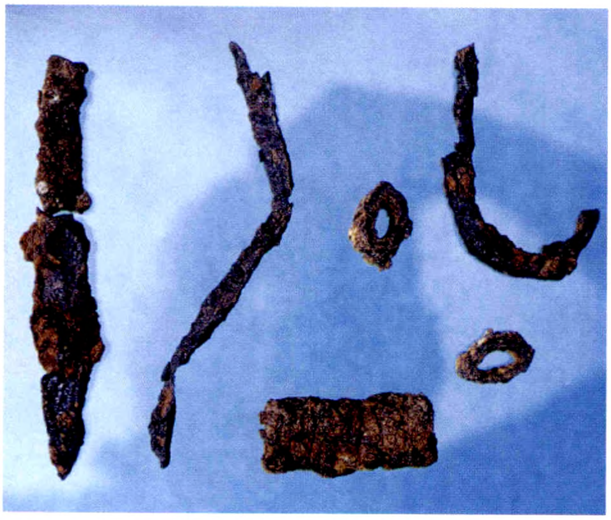

Fig. 10. Iron objects from kurgan 27 of the Balyk-Sook I burial ground.

Tuvinians (Wainstein, 1991: fig. 60, *2, 4*). Analysis shows that the closest analogs to the Balyk-Sook ceramic barrel (by shape and size) are found among the vessels of the Kamenskaya Culture, which is also supported by other archaeological finds.

Iron objects and their fragments were found in both barrows of Balyk-Sook. Because they are strongly corroded and unexpressive, these objects are of little help in cultural attribution and dating of the barrows. The iron objects include a fragment of a gilded hairpin with a spherical tip (barrow 21), knives, a hook from a quiver, and a clip for a waist-belt from barrow 27 (see Fig. 10). Objects of such types are often found at the archaeological sites of the Altai, Tyva, and the Upper Ob River basin (piedmont cultures) (Rudenko, 1953: plates XXIX, *7*; LXXIX, *1*, *2*; Kubarev, 1987: fig. 19, 25, 37; 1991: 111 – 112, fig. 15; 1992: fig. 26, *5 – 7*; Grach, 1980: 34, 36, fig. 109, *3*, *4*; 112, *3*; Mogilnikov, 1997: fig. 47, *4*, *6*; 50, *1*, *2*; 57; Kiryushin, Frolov, 1998: fig. 6, *5*; 10, *1*, *2*). Such objects were used at all stages of the history of ancient nomads (7th – 2nd centuries BC).

Arrowheads (see Fig. 11) found in barrow 27 totals six specimens including three bronze three-blade arrowheads and three arrowheads made of horn. One of the horn arrowheads had a blade stalk and was of an asymmetrical rhomboid form; two others

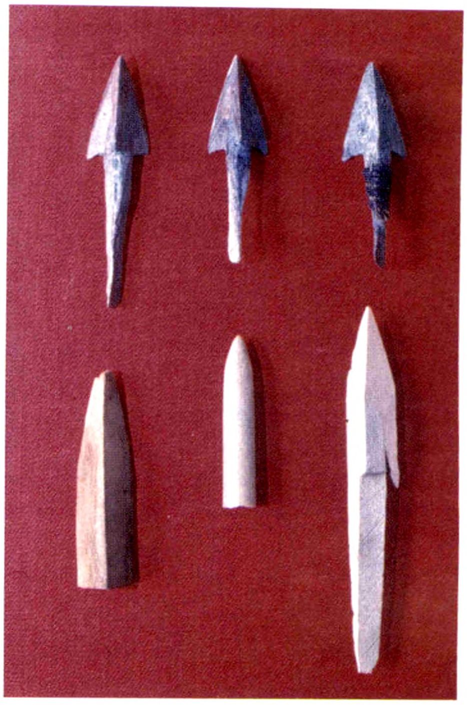

Fig. 11. Bronze and horn arrowheads from kurgan 27 of the Balyk-Sook I burial ground.

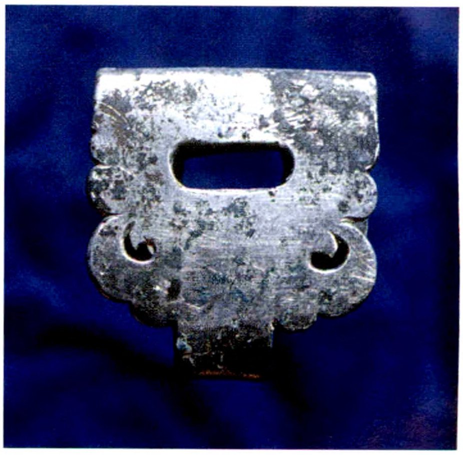

Fig. 12. Silver belt clip from kurgan 27 of the Balyk-Sook I burial ground.

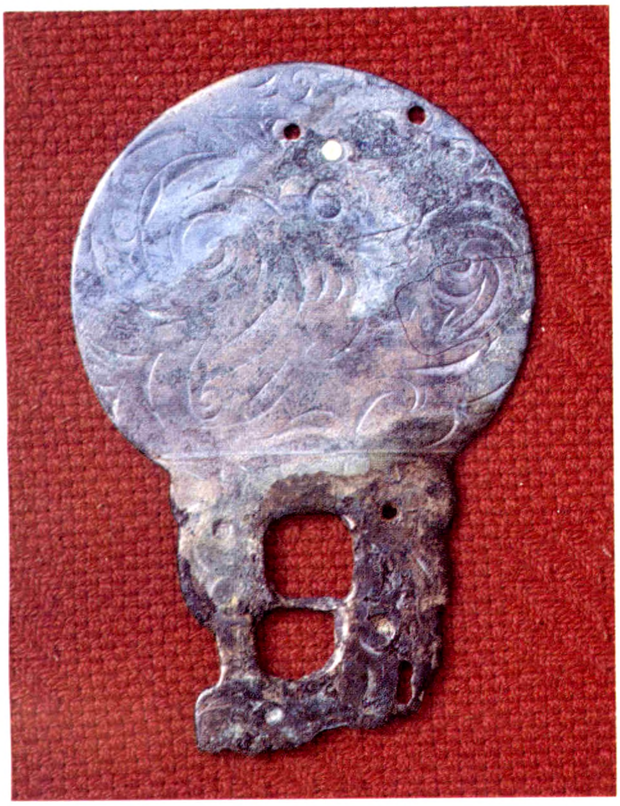

Fig. 13. Bronze mirror with an engraved, stylized image of a bird on the reverse side. One eye is encrusted with a golden rivet. Kurgan 27 of the Balyk-Sook I burial ground.

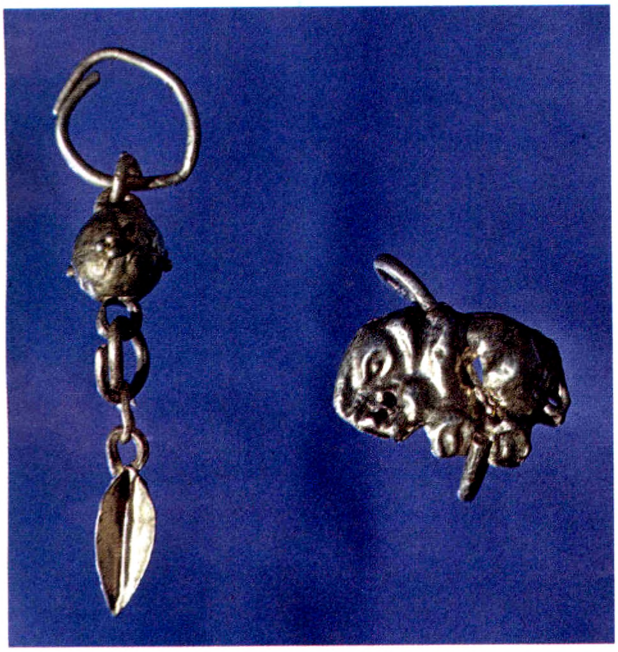

Fig. 14. Golden earring with a pendant with golden grains decorated with a small arrowhead (on the left); golden hollow pendant from the second earring depicting a feline (to the right). Kurgan 27 of the Balyk-Sook I burial ground.

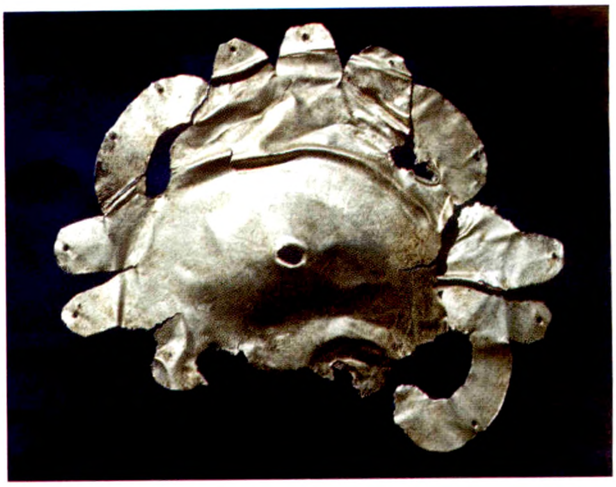

Fig. 15. Golden foil covering a patterned clip for a quiver. Kurgan 27 of the Balyk-Sook I burial ground.

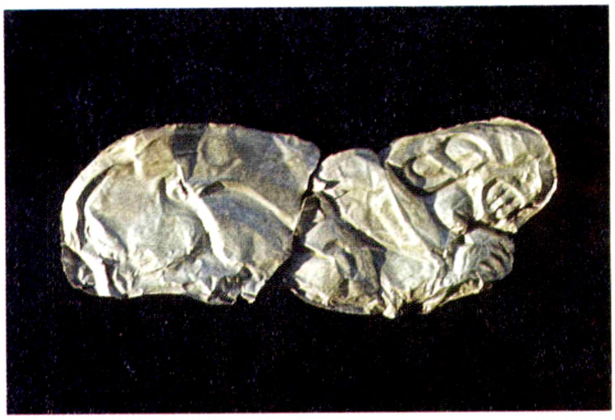

Fig. 16. Golden foil covering a necklace terminal depicting a snow leopard. Kurgan 27 of the Balyk-Sook I burial ground.

belonged to the type with cylindrical stalks and had three-edged and bullet-like forms. Such a small number of arrowheads found in tombs is typical of the Pazyryk burials of the Altai (one quiver contained from 1 to 10 arrowheads) (Kubarev, 1987: 71; 1992: 74 – 77; Kocheev, 1987: 55 – 60). An analogous situation is seen in the materials of the Bolsherechenskaya and Kamenskaya cultures of the Upper Ob basin. As Mogilnikov believes, the development of various forms of arrowheads in the steppe and forest-steppe regions of the Upper Ob basin and the Ob-Irtysh region in the middle – second half of the 1st millennium BC generally followed the development scheme known among the Saka of Kazakhstan and western Central Asia and the population of the Sayano-Altai mountains (1997: 55). We agree with this author because the Balyk-Sook set of arrowheads of various forms are analogous not only to the Gorny Altai finds (Rudenko, 1960: 37 – 38, fig. 17; Kubarev, 1987: fig. 24; Polosmak, 1994: 30;

Molodin, 2000: fig. 135) but also to some finds in the Scythian-type cultures from neighboring territories (Smirnov, 1964: fig. 3, *8*, *a*; 35A, *ц*; Grach, 1980: fig. 66, 85, *3*; 86, etc.; Kadyrbaev, 1984: fig. 1, *36*, *43*; Ivanov, 1987: fig. 2, *31*, *32*; 3, *7*, *17*; 8, *8*; Kiryushin, Frolov, 1998: fig. 6, *7 – 9*; Novgorodova, 1989: 269, 279, 293). Many scholars note that it is difficult to determine the date of a tomb based only on arrowheads, because the latter were often in use for a long period (6th – 3rd centuries BC) among the mountain–steppe tribes of western and eastern Central Asia. The same range of dates is characteristic for the set of arrowheads from the Balyk-Sook tomb.

A silver belt clip (see Fig. 12) is massive in size (7.3 × 6.7 cm). It has no exact analogs and can be attributed to a rare type. The clip performed two functions. this fastener of a warrior's belt (a thickness is 6 cm) has a hole for a waist-belt in its middle part and a hook in its lower part. The purpose of the latter detail is unclear. The simple symmetrical ornament is formed by two comma-shaped holes (a technique typical of the Pazyryk art) and arched edges of the plaque. In this ornament, two artistic motifs can be seen: one is a highly stylized tow-headed predatory bird, and another is a horn-shaped pattern. The general form of this clip is similar to that of small bronze or iron fasteners (or their imitations) found in the barrows of ancient nomads in the Altai. They served for hanging weapons (a dagger and a battle axe) to the belt (Rudenko, 1953: plate XXVII, *1*, *2*, *5*, *11*, 1960: fig. 137, *b*; Kubarev, 1987: fig. 28, *11 – 15*; Polosmak, 1994: fig. 32). Previously, we noted certain regularity: men buried in the Scythian period in the Altai, Tyva, and Mongolia had only one metallic clip of this type on their belts (Kubarev, 1991: 89; Mogilnikov, 1997. 71); however, their wooden imitations were presented in sets of three or four items of this sort (Kubarev, 1992: 81 – 84; Polosmak, 1994: fig. 32; 2001: fig 111; Molodin, 2000: fig. 124). This disparity has yet to be explained.

A bronze mirror (see Fig. 13) has the following dimensions: a diameter of 92 mm, a total length including the handle of 132 mm, disc thickness of 1.5 – 1.8 mm. The front surface is smooth and polished; a stylized image of a bird with open wings shown with spirals, volutes, and 'commas' is depicted on its reverse. The bird's eye is encrusted with a golden rivet. Several identical through holes 0.5 cm in diameter drilled in this mirror (at the end of the disc and the handle, and one near the ear of the fantastic bird) were probably made for encrusting with golden rivets or precious stones, which were not preserved. A broken handle with unclear engraving depicting a predator has two round holes necessary for fastening the mirror to the belt. According to our classification (Kubarev, 1987: 90 – 91), the Balyk-Sook mirror belongs to type 1 (with a side handle in the form of a low-relief image of an animal or bird's head). On the reverse side of such mirrors, which were widely spread among Eurasian nomads in the 7th – 3rd centuries BC, one can often see engraved and relief images of various animals in the Scytho-Siberian animal style*.

Golden earring (see Fig. 14, on the left). The earring is made of thin coiled wire with a loop at the end. This is a typical decoration of ancient Asian nomads in the Scythian epoch. However, this earring has a unique hollow spherical pendant decorated with golden grains (three small grains on each of the four sides of the sphere), and a miniature model of an arrowhead is attached to the pendant with a short chain. The earring has a diameter of 1.2 cm, and its total length including the pendant is 5.2 cm. The closest analogs to this jewelry object are golden earrings found in the Altaian barrows of the Yustyd, Kor-Kechu, Malyi Gonbinskii kordon, and Elunino burial sites (Kiryushin, Frolov, 1998: 124, fig. 11, *1*). Golden earrings with three pendants were known among the Scythians and Savromatians (Kubarev, 1991: 132). Archaeologists unanimously date decorations of this rare type to the 6th – 4th centuries BC. Obviously, our find can be attributed to the indicated period; moreover, another golden pendant from the earring of this type (see Fig. 14, on the right) was found in the burial. This pendant is a miniature figurine (2.0 × 1.2 cm) depicting a feline predator, which is a popular image in Scytho-Siberian art. However, animal figurines are rarely found to decorate earrings. We know of only one such earring, with a pendant depicting a mountain goat, found in a Savromatian barrow near the village of Sara (Smirnov, 1964: 142 – 143, fig. 35B, *9*). Rare finds of such pieces of jewelry and the complex technique of their manufacture suggest that they were imported, probably, from the Achaemenid Iran or western Central Asia.

A golden plate covering a semispherical clip (see Fig. 15) is also a rare find, which has no exact analogs among the great number of decorations of the Scythian period. The appearance, form, and the hole in its center are similar to iron and wooden quiver plaques covered with sheet gold (Kubarev, 1987: fig. 25, *8*, *9*; Polosmak, 1994: fig. 20, *6*; 98; Molodin, 2000: fig. 134). However, a large size (a diameter of 9.5 cm), a considerable thickness of the golden sheet, and small holes (for fastening) suggest that this plaque was used for other purposes. Probably, the plaque served as a decoration of a headdress or clothing. A.D. Grach named similar plaques stamped of gold "cockades" and believed that they were prestigious decorations of headdresses of the Saglyn warriors (1980: 81, fig. 39, *3*; 68, *1*, *2*). However, the fact that these rare golden objects (there are 4 known examples, including the Balyk-Sook find) were found in female burials (Kubarev, 1991: 122 – 123, plate XXI, *b*) attributes them not only as signs marking their social status and affiliation with the warrior class, but also as ritual decorations. The aforesaid is supported by a "vortex-like" ornament on the Altaian plaque and stamped depictions of triple patterns of eagle heads on the Tyvinian plaques, which are commonly considered solar symbols. A simple ornament on the Balyk-Sook plaque can be interpreted as stylized bird heads, which have some common features with the decoration of the front side of the belt plaque and the reverse side of the mirror from the same burial.

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* A reader may refer to the work that summarizes information on mirrors published by the author in Germany (Kubarev, 1996)

A golden covering plate of a necklace terminal (see Fig. 16) preserved the form of a wooden (?) figurine of a snow leopard – the most popular image in Altaian animal art of the Scythian epoch. A large number of paired wooden terminals of metallic necklaces depicting figures of snow leopards or their heads were found in the burials of the Pazyryk Culture, such as Ulandryk, Yustyd, Barbugaza, Ak-Alakha, and Verkh-Kaldzhin. The Balyk-Sook find is identical to the Pazyryk necklace terminals in size (8.3 × 2.5 cm), style (a lying predator with a raised head), and the tradition of covering carved images with sheet gold. We may suppose that this imitation was produced at the time when zoomorphic necklace terminals were spread in the East Altai (5th – 3rd centuries BC).

Conclusion

Analysis of the funerary rite and new finds from the two Altaian barrows with diagonal burials yielded the following results:

1. Barrows with diagonal burials were discovered in the Altai for the first time.

2. A number of articles from the Balyk-Sook barrows are dated to a wide chronological period. However, comparison of a few articles typical of the Scythian epoch that were found in the diagonal graves with finds from synchronous sites located in the adjacent territories of Siberia and Central Asia allows us to date the Altaian barrows to the 5th – 4th centuries BC.

3. At this time, it is impossible to determine precisely whether the people buried in the Balyk-Sook burials were the Savromatians, Sarmatians, or more probably, the bearers of the Prokhorovo Culture. However, we may say that in the middle of the 1st millennium BC, they migrated to the Altai Mountains and were probably assimilated there by the Pazyryk population. It is also possible that small groups of Savromatians were involved in the process of the migration of the Saka-Pazyryk population to the Altai; this Savromatian community retained one of the most distinctive features of the funerary rite, the diagonal orientation, which was widely used in their native land – probably the Volga Basin or the South Ural Mountains.

4. Obviously, it is not accidental that barrows 21 and 27 were built between two Pazyryk burial grounds where the representatives of ancient Altaian nobility were buried. The mound sizes, depths of burial pits, and remains of grave goods suggest that the diagonal burials were rather rich. It might so happen that the people buried in the diagonal graves and the Pazyryk burial grounds were kindred with each other. In any case, the barrows with the diagonal burials imitate the order of the Pazyryk barrows (a chain of barrows stretching from south to north, running across the Ursula River valley). A very important moment in inter-tribal contacts was when both the migrants (a Caucasoid anthropological type of the Balyk-Sook people) and the Pazyryks belonged to the Iranian-speaking peoples. We note that evidence from the diagonal Balyk-Sook burials testifies most clearly not only to the cultural contacts among the Savromatian, Sarmatian, Saka, and the aboriginal tribes of the Upper Ob River basin, but also to the contacts with ancient nomads of Tyva and Mongolia.

5. The search for new barrows with diagonal graves in the Ursula River basin must be continued. New materials will give valuable data on the routes of migration of the Savromatian–Sarmatian tribes to the Altai and the role of these processes in the ethnic history of Inner Asia in the middle of the 1st millennium BC.

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BRONZE MIRRORS FROM THE POKROVKA I SETTLEMENT

Introduction

The 1996 rescue excavations at the Pokrovka village (the Bikinsky administrative region of the Khabarovsk Territory) located in the territory of a customhouse on the Ussuri River bordering the People's Republic of China yielded two bronze mirrors. One of the mirrors had a hieroglyphic inscription (Kramintsev, Laskin, Kiselev, 1996). The mirrors were found together with two iron conic pendants in the upper layer of a large oval pit 2.2 × 1.43 m in size and 0.25 m in depth. Six round holes were revealed on the pit bottom, five of which were situated close to each other in the southern part of the pit. The pit was oriented from north to south and filled with dark brown, loamy soil with inclusions of ceramics, animal bones, and clay coating*.

These finds might be related to household construction; probably, a storage pit or a pile building. Remains of numerous pile constructions such as round pits left from supporting posts running in rows, were found nearby. Obviously, the mirrors were placed intentionally for protective purposes "to ward off evil spirits with a power of the sunlight reflected by these mirrors, thereby preventing spoiling of food supplies" (Shavkunov, 1981: 109; Shavkunov, Boldin, 1976). It is known that conic pendants are important attributes of the shamans, and their find suggests the use of mirrors in the shaman costume as intensifiers of the shaman magic power.

Undoubtedly, bronze mirrors are among the most informative and remarkable objects of ancient art. Studies of bronze mirrors provide a deeper insight into the technological aspects of ancient bronze casting and allow us to trace various forms of contacts (including foreign trade) and even to obtain valuable information about the esthetic and religious ideas of peoples who created them. Mirrors were used not only as toilet ware, but were also endowed with negative or, more often, positive magic properties (see (Stratanovich, 1961; Khazanov, 1964; Litvinskii, 1964; Vasiliev, 1970; Shavkunov, 1993)).

Chemical composition of the bronze mirrors

Spectral analysis of the mirrors indicated that they are produced of a highly leaded bronze containing over 30% of lead, over 10% of tin, and some micro-alloys. In the mirror with an inscription, the traces of antimony and iron reach 1%. Mirrors of tin-lead bronze are known to have been used from the 4th century BC to the 16th century AD (Konikova, 1989: 79). However, this is the first time that mirrors exhibiting such a high tin and lead content have been found. At the beginning of the 20th century, it was reported in the literature on bronze casting that the bronze alloy used for producing mirrors contained copper and 30% tin (Knabbe, 1901: 213). Recent data suggest that this alloy includes fine light arborescent crystals on a background of finely dispersed particles (Ravich, 1983: 138). Obviously, lead was not used in the

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*Laskin A.R , Report on the 1996 rescue excavations of the Pokrovka settlement in the Bikinsky administrative region of the Khabarovsk Territory, Archival Depository of the Institute of Archaeology, RAS, Moscow

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"mirror" bronze because of its specific properties, e.g., insolubility (Maltsev, 1970: 133 – 134, 180 – 183), which prevented the production of a surface with appropriate reflecting characteristics. However, the addition of lead enhances the fluidity and density of an alloy, and these are the most important characteristics for the production of art bronze ware. Generally, the trace elements in the tin-lead alloys of both mirrors are equivalent to those revealed in the bronze ware found at sites located in the Amur River basin and the Maritime region (Primorye) (Konikova, 1989; Galibin, Kramintsev, 1990), and this reflects the composite geochemical character of the Far Eastern complex ores.

Description of the bronze mirrors and interpretation of the inscriptions

Mirror II-96-9 is a thin flat disc 8.5 cm in diameter (Fig. 1). A high semi-spherical knob is placed in the center of the back of the mirror and is surrounded by small protrusions. Similar small projections follow a wide flat border around the decorated area. A stylized floral design produced in a flat relief technique is seen in the decorated area. The four patterns composed of fine wavy volutes with ceratoid "grape-vine" elements in the center comprise the design of the mirror, which probably stems from the ancient stylized "cloud ribbon" pattern especially popular in Han times (Lubo-Lesnichenko, 1975: 12). Such patterns are considered to be stylized fantastic animals: a dragon and a dragon-bird (Lubo-Lesnichenko, 1994: 185). The design is not clearly contoured, which most probably indicates that this mirror is not authentic. Visual examination shows a high quality of metal, which is similar to the so-called "white bronze".

Mirror II-96-5 is round; its diameter is 10.6 cm (Fig. 2). A high central knob is flat on the top and is surrounded with small protrusions. A high narrow border inclined to the center is also separated from the decorated area by small protrusions. Four pairs of geese flying under the clouds are depicted in the decorated area. The small central circle of protrusions and the knob symbolize the Earth, while the geese surrounding the knob and the clouds personify the four cardinal points. Mirrors with similar designs are known in Primorye (Shavkunov, Konikova, Khorev, 1987: 88 – 89, fig. 8; Shavkunov, 1988: 65 – 67, fig. 3). The stylized clouds closely resemble the fantastic mushrooms *zhi*, the Taoist symbols of long life and immortality. It is known that geese in the Far East symbolize *yang* that is an active principle of nature. According to a legend, geese always fly in couples and signify allegiance in marriage. This mirror can be regarded as a wedding mirror, in which pairs of birds symbolize a happy marriage and the mushrooms

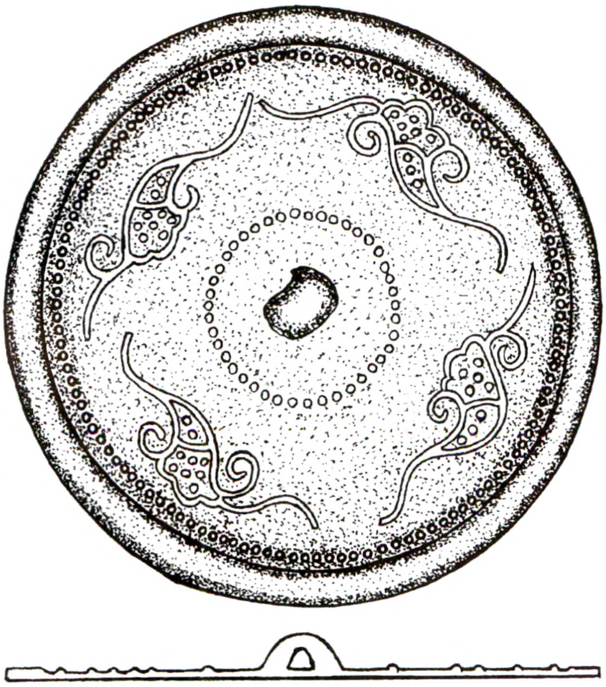

Fig. 1. Mirror II-96-9.

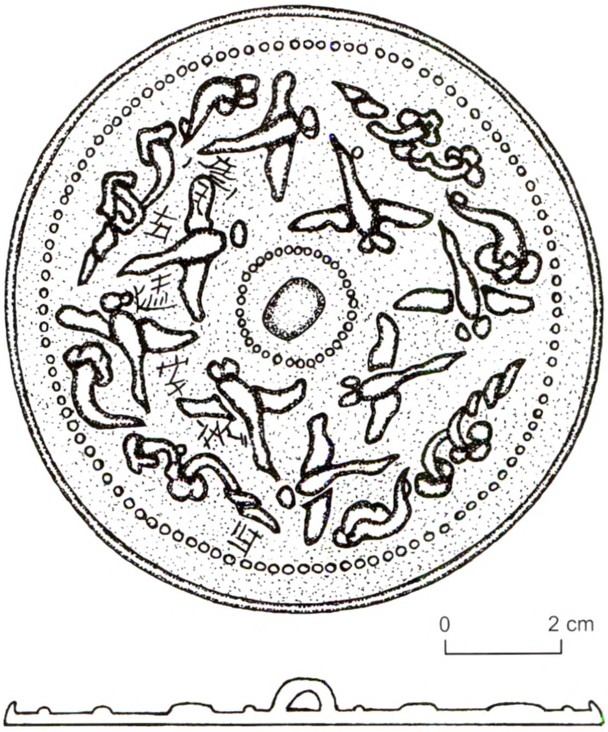

Fig. 2. Mirror II-96-5.

zhi mean longevity. Wedding mirrors were widely used during the Tang period (Lubo-Lesnichenko, 1975: 20). We note that on the Chzhurchzhen mirrors of the 12th – early 13th century BC from the Primorye, the motifs related to Taoist legends and ideas of immortality and longevity are the most widely distributed (Shavkunov, 1981).

The design of the Pokrovka mirror is produced in the high relief technique. Seven characters are pecked with a small chisel. The characters "*khao gu meng'an...*" run vertically and should be read from the top downward.

The first and second characters are "*khaogu*", which is the name of a military-administrative unit "*meng'an*".

The third and fourth characters – "*meng'an*" – have two meanings: a head of 1000 farms and an administrative unit of the Chzhurchzhen Jin Empire. Unlike districts (*zhou*) and counties (*xian*), both *meng'an* and smaller *mouke* were more typical of the northern and northeastern territories (initially, these territories belonged to the Chzhurchzhen).

The fifth character most probably corresponds to the family name of a person who registered this mirror. This character is rather difficult to identify correctly. It is also possible that this is a character *ji* (to record, to register).

The sixth character is the Chzhurchzhen signature of a registering official. The same characters are often found among the signatures on the Chzhurchzhen registration records on mirrors and silver bars.

The whole inscription can be translated as "[Registered] in the *Khaogu meng'an* [official's surname] [his signature]."

Conclusion

Registration records inscribed on mirror borders are not unusual for the Jin mirrors. They appeared due to the so-called "prohibition of copper" (i.e., the individual production of mirrors and other bronze decorations was prohibited) experienced in the Chzhurchzhen Empire in the middle of the 12th century. Inscriptions of this type indicate the act of registration of bronze mirrors in constabulary institutions of the Jin Empire. Although these inscriptions are known mostly on mirrors, there is also a registration inscription on the back of a Buddha figurine found at the Ananievo fortified settlement in Primorie (Ivliev, 1978). Most often, inscriptions were placed on the mirror borders, and not in the decorated areas. However, there are some mirrors with inscriptions in the decorated areas; for example, a mirror with hermits and longevity symbols from the Ananievo fortified settlement. This unusual place for an inscription was chosen because the form of the edging is rare among the Jin mirrors: there is no place to inscribe.

Another interesting fact is the word "*men'an*" inscribed on our mirror instead of the more usual names of capital, county, and district constabulary institutions of the Jin Empire. Obviously, this is due to the fact that there were no counties or districts in the *Haogu men'an*. This situation was typical of the territories of the Chzhurchzhen proper, namely, in the Sungari, Amur, Ussuri, Suifen, and Tumangan river basins. In the preserved Jin inventories of *men'an*'s, there is no information about the *Haogu men'an*. This new important evidence throws light on the name of one of the most remote north-eastern *men'an*'s of the Jin Empire.

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NEW FINDS OF ANCIENT METAL WARE IN THE OB-UGRIAN SANCTUARIES

Introduction

The second half of the 20th century witnessed quite a number of important discoveries of medieval bronze ware, which had been hidden in functioning sanctuaries of the Khant and Mansi people (Gemuev, Molodin, Sagalaev, 1984; Gemuev, Sagalaev, 1986; Tylikova, Baulo, 2001). These discoveries enable researchers to see how certain ancient cult objects have recently been used in religious and ritual practices of the indigenous peoples of northwestern Siberia. They also help to promote a better understanding of the original functions of the ancient bronze anthropo- and zoomorphic articles.

This paper focuses on the medieval bronze and silver articles that have been discovered in the course of recent ethnological expeditions to the northern Ob River Basin (the Berezovski, Beloyarski, and Shouryshkarski administrative regions of the Tyumen Province).

Home sanctuaries of the Ob-Ugrian people

The ancient bronze and silver articles to be discussed here were kept in Khant and Mansi home sanctuaries among other cult objects. The basic features of the placement of "sacred" articles within living zones were described in detail by I.N. Gemuev (1990) based on the example of the Northern Mansi population group. In accord with the tri-spherical model of the Northern peoples' religious conception of the Universe, a family house is divided into three vertical strata. A garret, symbolizing a sphere of the Upper Realm, is regarded as a place of extreme sacred significance. The images of the family spirit-protectors as well as other cult articles are usually placed in the garret, at the '*mul*,' a wall in the rear part of the house opposite the entrance. Formerly, when Mansi houses were built without garrets, the sacred function was performed by special "spirit shelves" adjoining the *mul*. The area in the immediate vicinity of the *mul*, both inside and outside the house, was prohibited to women. A post for lashing sacrificial animals was placed in the exterior *mul* area. In the ancient past, the sacred place was located outside the living zone, at some distance from the *mul*, the south wall of the house. With the emergence of large settlements and the growth of population, including people of different nationalities and livestock, no "clean" land was left suitable for gods and spirits. Such "clean" places began to be specially constructed, usually close to the ceiling or in the garret. The garret was established as a prohibited area for women as "unclean" creatures. A man can only execute propitiatory deeds in the gods' living zone – for instance, feeding, dressing and changing the gods' clothes, adding new gifts to their existing wealth, etc. Thus, three vertical zones were established in the Mansi house: the upper zone including a garret or a corresponding "sacred shelf"; a human living zone, and a lower realm (a cellar) (Ibid.: 13 – 20).

A similar arrangement of living zones has been noted in the dwellings of the Northern Khants. Presently, the Khant population prefers to live in traditional Russian log houses. However, individual examples of uninhabited "old-fashioned" houses were encountered in certain villages: Yukhan-kurt on the Malaya Ob, Vytvozhgort on the Synya, and Vershina-Voikar on the Voikar. These houses have no ceilings separating the room from the garret; plank beds are made along the walls. In such houses, "sacred" boxes and trunks are kept on the upper plank beds at the rear wall. In modern times, the family fetishes are deposited in two places. One sacred place is located in the living room, in which a special "sacred" shelf is constructed in the right (sometimes in the left)

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corner, at a height of 1.5 m from the floor. Small boxes and trunks, bark cases, and even glass jars containing family cult objects and spirit images are located on this shelf, covered with a curtain. The shelf and the adjacent area is considered '*mul takhi*', a sacred area in the house; offerings to spirits are called '*el punty ot*' (Lapina, 1998: 103, 105). Ritual articles belonging to past inhabitants of the house are deposited in the garret. Boxes, trunks, and chests are placed on a special plank dais at the rear wall. Skins of sacrificed animals are hung on roof beams. Men are allowed to take the sacred relics out of the house only on feast days or for ritual ceremonies. Otherwise, it is prohibited to touch these sacred articles. It is believed that touching them results in punishment imposed by the highest forces – an offender may have his hand injured or lose his fingers (Ibid.: 20, 70).

Manufacturing a "sacred" box was a rather complex procedure. Often a shaman declared the necessity of such a work during a fortune-telling ritual. In case the people could not buy a ready-made chest, the master of the house made such a box himself. He also made an arrow, which was placed on the box cover. The first things placed in the box (sacrificial blankets, ritual gowns for the Bear cult dances, attire for spirit-protectors, and gifts for gods) had to be made by an old woman. If there was no skilled person in a village, people invited artisans from other places. E.D. Moldanova, a resident of Vanzevat, explained: "An ordinary person could never do such work. If one is not skillful in manufacturing such things, he or she will make crooked goods; as a result, both your house and your children would have a bad fate – the children could even die." Upon finishing the box, a sacrifice must be made. The back of a sacrificial animal, a horse or reindeer, is covered by shawls, gowns, and blankets, upon which the box is placed. Prior to slaughtering the sacrificial animal, the box is taken down and put near the laid table. Upon the sacrifice, the box is taken back to the house and placed in the "holy" corner.

The Berezovo Khants* have a tradition to use a separate "sacred" box for storing the gifts of each spirit protector: *Ai-as-iki*, "Old Man of the Malaya Ob," *Em-vozh-iki*, "Old Man of the Holy Town," "the village god," etc. The Mansi people, closest neighbors of the Khants, stored the gifts for different gods in a single box.

Sacrifice to propitiate gods and spirit-patrons are major events in the family sanctuary. In the course of these rituals, people pray to gods to grant well-being to the members of the family The shawls and gowns are taken out of the chests in the "holy" corner and hung on nails high on the walls of the room for three days. The sacrifice is usually made behind the house, near the post. Recently, however, animals have been tied to a prominent portion of a wall log at the outer corner of the house. Such a tradition stresses the people's intention to sacrifice an animal for the sake of the well-being of the inhabitants of a particular house.

The ritual consists of praying, as shawls and gowns are spread out on the animal's back. People pray to the god to accept the sacrifice, secure the house and people from damage, and protect children and grandchildren. The chests containing "sacred" goods are opened and placed on small wooden sledges. A glass of vodka is placed next to the chest, along with plates of cooked meat. Sacrificial food is also placed by the chests in the garret and on the "sacred" shelf inside the house. The shawls that have been offered during the ritual are hung inside the room for two days, after which they are deposited in the chests in the garret.

Hoard discoveries

Ancient bronze- and silver-cast items representing human and animal figurines are often used as cult attributes in the Khant and Mansi family sanctuaries. The circumstances of discoveries of such artifacts are almost always forgotten. The fact that the owners stay uninformed about their belongings may be explained by a tradition. The family sanctuaries accumulate the offertory goods through generations; a son is able to see his father's attributes only after the death of the latter. Most often people put new gifts for their spirit-patrons on top of the old ones without knowing what is deposited at the bottom of the chest. This practice is in full accord with the rule, "Do not take out the things that you have not put in." That is why the discovery of ancient bronze or silver articles in a family chest is a surprise for both researchers and sanctuary owners. In some cases, however, information about the discovery of bronze and silver articles that are still used in ritual practice is not available. Most often, ancient bronze articles were found in washed-out riverbanks and at abandoned settlements. Stories tell of discoveries that took place at the end of the 18th century, in the second half of the 19th century, and even in the 1930s. The last period coincided with the time of the Soviet campaign against religious cults and shamanism. People used to hide their "holy" attributes in the taiga or in bogs, and other people discovered them very soon afterwards.

Indigenous Siberian people believed that such articles were made by legendary heroic ancestors. U.T. Sirelius, a Finnish scholar who traveled in West Siberia in the late 19th century, got the following information from an interviewee, a resident of the Vasiugan basin:

> The Ostiaks used to make iron and brass themselves in the past... Local people thought that the equipment for metal working was taken away from them by the tsar...The old man told me that brass articles were discovered in many places along the

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* A local Northern Khant population group inhabiting the Berezovo region.

> banks of the Koimegan; these articles were made by the former Ostiak population that had not been baptized. For instance, a hollow horse figurine with four legs… When somebody found such a thing, he used to throw it out, because he feared that if he took the finding home, he would die (Sirelius, 2001: 107).

The Mansi people had a different attitude towards such findings. A. Kannisto recorded several legends early in the 20th century. People believed that a hoard (a hidden treasure) was marked by a small sparkling light; in order to get hold of the treasure, it was necessary to jump into this fire. If the flame was guarded by an old man, it was necessary to knock him down with a punch directed from left to right. In such a case, the old man fell to the ground, the fire died down, and the hoard was opened. The discoverer may take only one handful of money; not to take anything was improper. The rest of the money could be taken the next day. The discovery of treasure should be marked by a sacrifice: some meat should be eaten at the place where the treasure was found, but part of the meat should be taken home. The bones of the sacrificed animal were collected in its skin and put into the hoard pit. One story holds that a hoard in the village Shaitanski was buried about 15 m deep. A "money staircase" led to the treasure; golden chairs stood beside a copper cauldron full of money and armor. In order to get the treasure, it was necessary to sacrifice a child – a boy or a girl about 7 – 8 years of age. The child's fingertip was cut off, and he or she was also pricked with a needle. The injured child, forced to run, left bloody traces leading to the treasure. One hoard was discovered in the vicinity of the Toboldiny yurt village in the upper reaches of the Severnaya Sosva. A legend tells of an old man and woman who saw a fire. The fire nearly died down when the woman beat it with an axe. The man broke a hooked birch and used it to pull out a brass cauldron full of money. Later, when the old people came back to the place where they had found the treasure in order to sacrifice a calf, the pit in the ground was closed. Soon after that they both died.

Still another legend is connected with the Rezimovy yurt village. It holds that in order to get the treasure out of the earth, it was necessary to sacrifice a dappled cow. In this case, the people would get as much money as the animal skin could contain. A. Kannisto also described a case involving two warriors. They were going along the bank of the Upper Lozva River, when suddenly one stepped through the ground. When he pulled his leg out, he saw many boxes in the pit, guarded by two wood-goblins. A human sacrifice was required to get this treasure. Legends of the Lower Lozva River also spoke of human sacrifices, as well as those of a white horse and a dog (Kannisto, 1958: 256 – 258).

Modern-day Mansi people also tell stories about treasure discoveries. The legend of the Synya Khants about "Money Girl's Cape" seems quite typical:

> Long long ago there lived a husband with his wife. They had only one daughter, and they loved her very much and saved all their money for her. But the girl fell ill and died. The old people mourned the loss of their beloved daughter and decided to give all their savings up to her: they filled a shirt with money and put it into the coffin together with the dead body of their daughter. They did it secretly so that nobody saw it. The girl was buried on a cape in the Nesyugan River. Years passed. Several times trees grew on the cape, people chopped them down, and the trees grew up again… The wooden grave marker was ruined, the wooden planks decayed, and no traces of the grave were left but a small grassy clearing. People noticed that if a person hopped into this clearing, a sound could be heard like that of a silvery peal. Many people searched for this treasure, but only on special days the earth disclosed the treasure to a kind and generous person – a girl came out and gave them gold and silver coins. Since that time, the cape has been named '*Okhan evi nel tai*,' meaning "Money Girl's Cape" (the story was told by A.I. Konkina, a resident of Ovgort, and recorded by E.I. Tylikova).

The Synya Khants traditionally sacrificed a reindeer to thank gods for the discovery of treasure; blood was poured onto the place where the hoard was found. An interviewee told that his great-grandmother had once found a hoard, but "then the people were greedy and did not make any sacrifice, the treasury was taken apart by many people, and nothing was left." The goods that have been discovered or "sent from Heaven" were regarded as family property and were included in the category of "sacred things." It was prohibited to put them in graves as grave goods and to sell them. Due to this tradition, ancient bronze and silver articles have been preserved in Khant family sanctuaries for dozens of years.

Description of finds

1. A figurine of a mounted horseman (Fig. 1). Cast bronze, manufactured in the northern taiga zone of the Ob basin, dated from the 8th – 10th centuries. Dimensions are 5.5 × 5cm. The man is shown sitting sideways on the horse, with his face and legs to the viewer. His left hand holds the horse's bridle, which is depicted by a chain of rounded knobs. His helmet is depicted in the same manner; the belt is shown by a small embossed band. He has a round face; his eyes and mouth are wide open. The horse figurine is placed on a stand. The figurine shows traces of later reworking – the horse's ears are thoroughly sawn off. The figurine was found in the village of Turvat-paul on the upper Severnaya Sosva in 1990. At the rear wall of a house there was a shelf with a trunk containing three images of family spirit-patrons. The head of one of these images consists of a bundle of shawls containing the horseman figurine

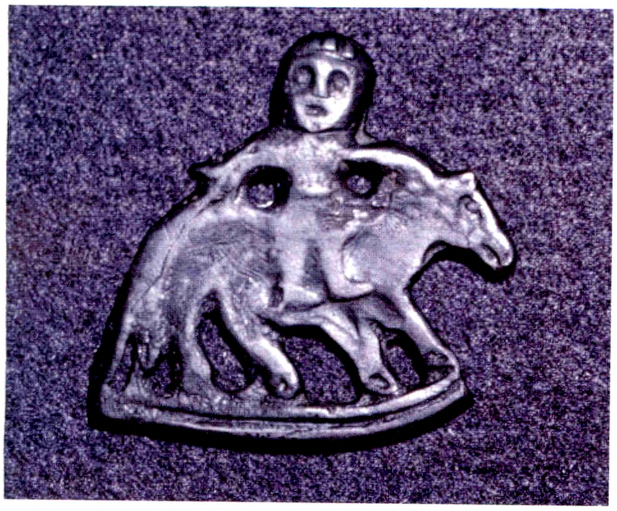
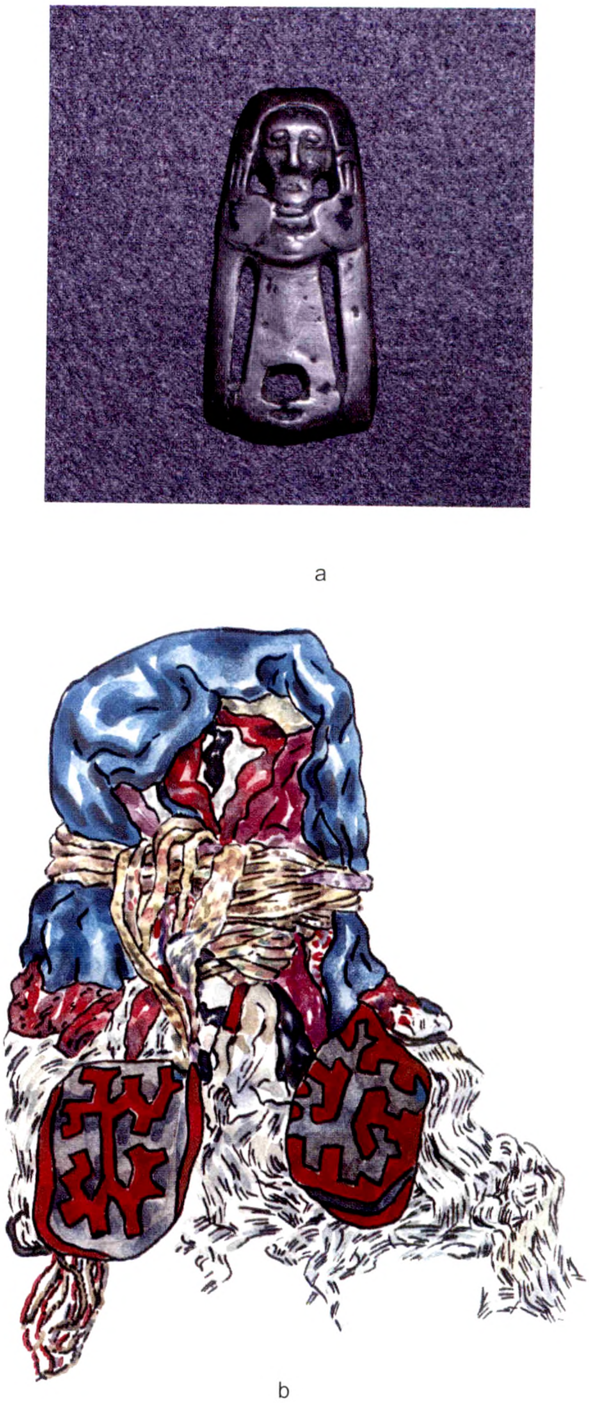


Fig. 1. Mounted horseman.

(Gemuev, Baulo, 1999: 18). A similar way of using ancient goods in ritual Mansi practice was recorded by V.N. Chernetsov in the 1930s. "In Nerga, an old man went fishing with a net. One of the nets caught a bronze figurine portraying a man on horseback. The man, thinking it was *Vit khon pyg* [Son of the Water King – **A.B.**], took it with him and treated this figurine as a home idol." (Istochniki…, 1987: 242)

The left part of the figurine deserves special attention. The right hand of the horseman seems to rest on the animal's croup. If our assumption is correct, the purpose of the two supports in addition to the horse's legs is not clear. The bronze figurine was thoroughly worked, so there is no reason for us to consider these two supports as casting defects. Possibly the figurine shows a killed fox carried by the hunter on the horse's croup. In such a case, it may be assumed that the detail initially taken as the hunter's hand represents the fox's head. The Ob Ugrians are known to have a tradition of portraying *Mir-susne-khum* (the younger son of their supreme god *Numi-Torum*) riding a horse whose croup is covered by a fox skin (Prytkova, 1949: 378). Thus, the bronze figurine of a horseman reflects the authentic appearance and the "equipment" of *Mir-susne-khum*, as known by the ancient population of West Siberia.

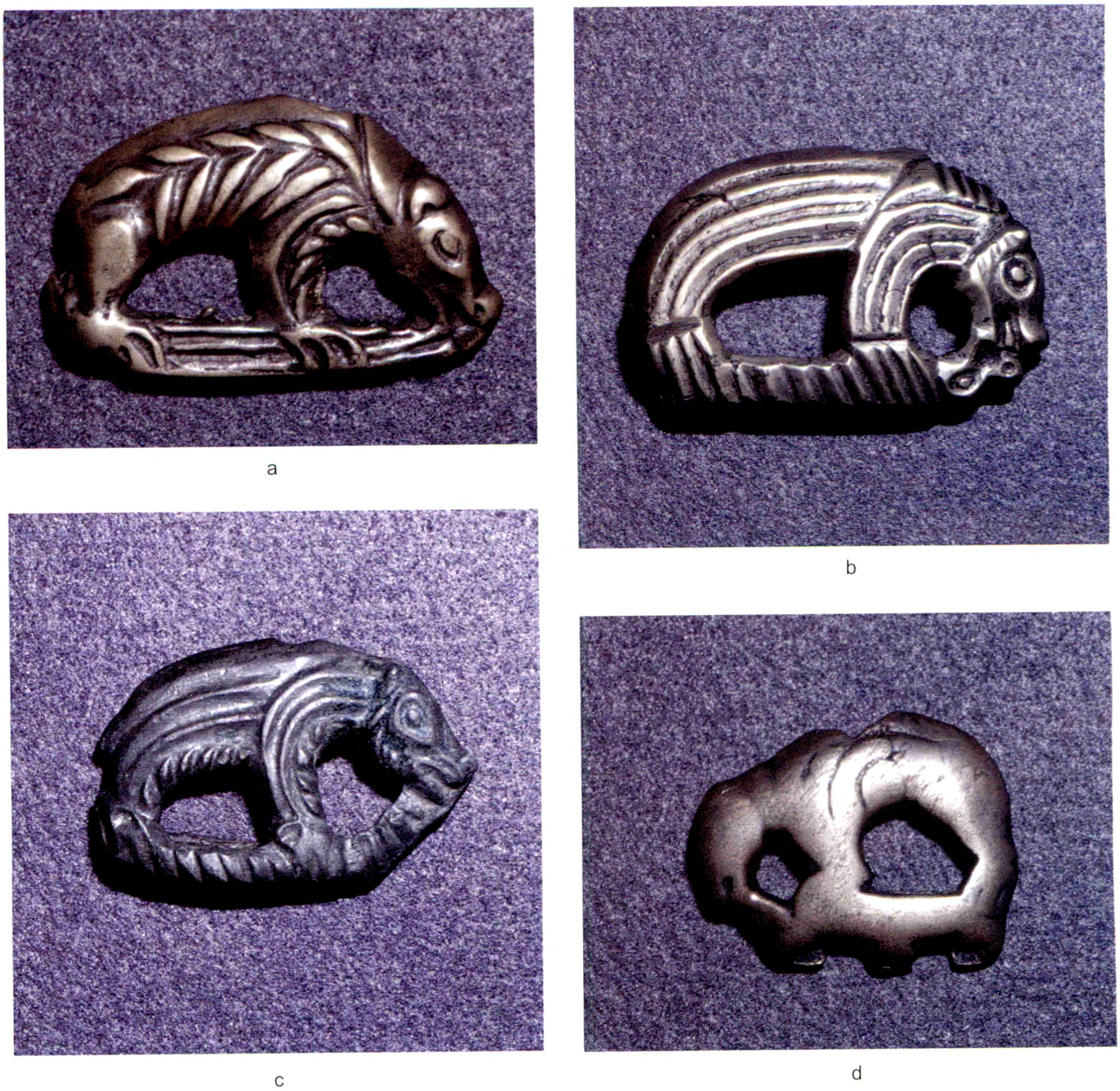
2. A bronze anthropomorphic figurine (a "chief), dated from the 8th – 10th centuries, was manufactured in the northern taiga zone of the Ob region. The article was cast in a flat mould. Its dimensions are 6.7 × 2 cm in the upper portion and 6.7 × 3.2 cm in the lower part. The hands held a bowl. The shoulders are covered with plates. The head is long, with forehead, eye-sockets and nose protruding from the face, suggesting a mask. The headgear is decorated with tasseled plaits hanging at both sides of the face. The neck is decorated with a torque. The "chief" is wearing a long shirt, beneath which short legs with two-toed feet are exposed. The figurine is framed with narrow metal strips. The obverse side of the piece shows a hanging loop attached to the head of the figurine (Fig. 2, *a*). This figurine was found in 2000 in the garret of a house in Anzhigort on the Malaya Ob. Inside the "sacred" trunk there was an image of a female patron. The figurine was placed in a small loose fur coat made of white reindeer fur. The figurine in the fur coat was covered by 10 to 12 large shawls tied up with several woolen belts.



a

b

Fig. 2. Khantic spirit-protector.
a – core of the bronze "chief" image; *b* – complete figurine of the spirit-protector.



a

b

c

d

Fig. 3. Bear figurines.
a – from Tugiany; *b, c* – from Yasunt; *d* – from Yukhan-kurt.

Miniature mittens decorated with stylized depictions of a bear were added to the attire, unusual accessories for the garment of a deity (see Fig. 2, *b*). Apparently, this figurine was interpreted as a depiction of a legendary ancestral war maiden and was utilized as an image of a patron. Such a sudden change in the perception of the figurine's gender might have occurred due to the deceitful braids of the "chief" or the fact that as time passed, the figurine was no longer seen underneath its shawls, so the former neutral spirit began to be perceived as a female figure.

3. A hollow bronze bear figurine (Fig. 3, *a*). Its dimensions are 6.5 × 4 cm. The figurine was cast in a double mould with a core and polished. The bear figure stands on a flat, grooved platform. The upper part of the back and the forelegs show decoration in the form of a pseudo-twisted cordon, and the body is decorated with a band in high relief. There is an opening in the figurine's back. The figurine was found in Tugiany on the Ob in 1998. The statuette was deposited in a "sacred" trunk covered with a bundle of narrow strips of light-colored fabric. In the mythological system of the Ob Ugrians, a bear (Old Man of the Sacred Town) represents one of the supreme deities who are believed to come to the Vezhakarsky yurt settlement on the Ob River. Practically any three-dimensional bear figurines, even Russian toys

or glass bottles shaped as bears, were perceived as representations of this spirit-patron and were used as cult objects by the Khant and Mansi peoples. I. Ides, a 17th century diplomat who passed through Siberia on his way to Beijing, wrote that the Ostiaks (the former name of the Khant and Mansi populations of North Siberia) had come to him and saw a clockwork bear toy. When the Ostiaks saw the toy working, they performed the necessary rituals and begged Ides to sell them this bear figurine so that they could make an idol of it (Ides, Brand, 1967: 94). The most common rite is to give the first forest berries to such images because the bear is a berry-picker.

4, 5. Bear images from the village Yasunt on the Liapin (materials of the expedition of 1999). One of these bronze figurines portrays two bears. It was cast in a twofold mould with a core and polished (see Fig. 3, *b*). Its size is 7 × 4.3 cm. The bigger figurine represents a she-bear; it stands on a flat platform shaped as a bear cub. The cub's head is turned toward the mother. The she-bear is licking the cub's muzzle with her tongue. Both figures are decorated with bands in high relief. The cub's back is flat. The she-bear's back has an opening.

The second bear figurine in this series is a hollow bronze statuette (see Fig. 3, *c*); its dimensions are 6.5 × 4 cm. It shows a bear standing on a flat, grooved, arch-shaped platform. The bear's body is ornamented with an embossed band. The rear legs are connected with the lower part of the back. There is an opening in the animal's back.

Both the figurines were kept in a "sacred" trunk together with other ritual attributes in the garret. Three bundles were made of red ribbon. One bundle contained silver coins dating from the mid-19th – beginning of the 20th century, the second bundle contained the bear figurine and copper and silver coins issued from 1870 – 1932, and the third one held a double bear figurine, with a silver coin of 1813 bound to it.

Analogous figurines reported from elsewhere in West Siberia (Zykov et al., 1994: 95) allow us to attribute the bear statuettes described above to the 10th – 12th centuries.

6. A zoomorphic pendant. The article represents a polished bronze image cast in a twofold mould with a core (see Fig. 3, *d*), sized 4.6 × 3.7 cm. Most likely this figurine portrays a bear tearing its prey. There is an opening on the animal's back. The lower part of the article is missing. Only three projections were left, probably representing an undetectable animal's head and paws. On the other hand, these remains may represent junctions between the main body of a knife or a staff's handle and a bear-shaped pommel. Similar examples of cast bronze figurines dated from the 7th – 11th centuries were recovered from burial sites in West Siberia (Ibid.: 91).

This pendant was reported from the Khant village Yukhan-kurt on the Malaya Ob in 1999. The figurine was bound in a cloth band and kept together with other gifts to the family spirit-protectors.

7. A bronze goat figurine standing on a flat platform (Fig. 4), an artifact from the northern taiga zone of the Ob watershed, dated to the 9th – 11th centuries. Its dimensions are 6.6 × 4.5 cm. The article was cast (with defects) in a twofold mould with a core. The reverse side of this figurine shows the ornamentation of the underside of the belly in the form of a band of beads. The figurine has two openings: between the horns and on the animal's back. The figurine was attached to a bundle of fox skins hung in the garret of one of the houses in Yamgort on the Synya (materials of 2001). The Ob Ugrians traditionally offered fox skins to spirit-protectors of various rank. In this case, the age and rarity of the figurine greatly increased the gift's value.

8. A bronze pendant (Muzhi village on the Malaya Ob, materials of 2001). Kama Basin, 13th – 14th centuries. The dimensions of this figurine are 8.2 × 9.7 cm (Fig. 5). The polished main body of the pendant was cast in a flat one-sided mould. The pendant represents paired horse heads with two holes in the upper part and five holes in the lower part of the article. Three- and five-linked chains carrying small paw-shaped pendants are attached to the lower holes (one pendant has been lost recently). Similar pendants are widely reported from the Kama basin (Oborin, Chagin, 1988: 143). This article, found in a hoard, most recently has been used as a decoration for a hunting belt.

9. A goose figurine (Fig. 6, *a*). This article was hidden at the bottom of a "sacred" trunk in Ovolyngort village on the Synya (materials of 2000). The figurine was cast of white bronze in a two-fold mould with a core. It was manufactured in the northern taiga zone of the Ob region around the 10th – 12th centuries. Its dimensions are 10.5 × 9 cm; the lower part of the figurine is 2.2 cm thick. The flow gate is missing. The figurine is one of the largest three-dimensional specimens of West Siberian medieval cast bronze. Traces of additional working with a knife are exhibited on the surface of the figurine. The lateral sides demonstrate an ornamental pattern in the form of two pseudo-twisted cords and two embossed bands. The back has an opening. A rippled column goes from the bird's beak to its breast. The goose's beak-shaped breast with an "eye" suggests a combination of two images in a single figurine. The rippled band may be regarded as a representation of a bird's crest (Fig. 6, *b*).

The massiveness of the goose figurine may be suggestive of a particular significance of this animal in the mythological perceptions of the ancient population of West Siberia. By the time the Russians colonized Siberia, a *Brass Goose* was one of the most esteemed idols (Novitsky, 1941: 60). The supreme god of the local population, *Mir-susne-khum/Muv-verty-khu*, was

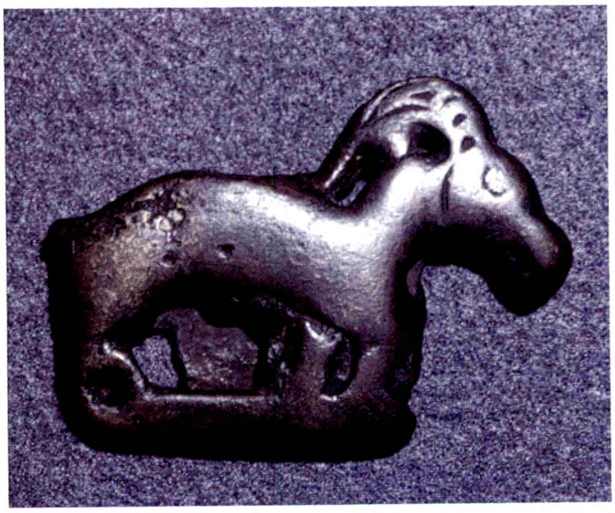
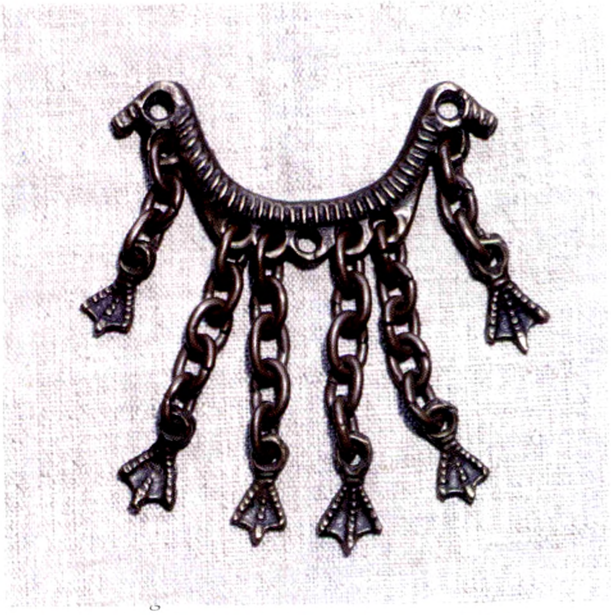
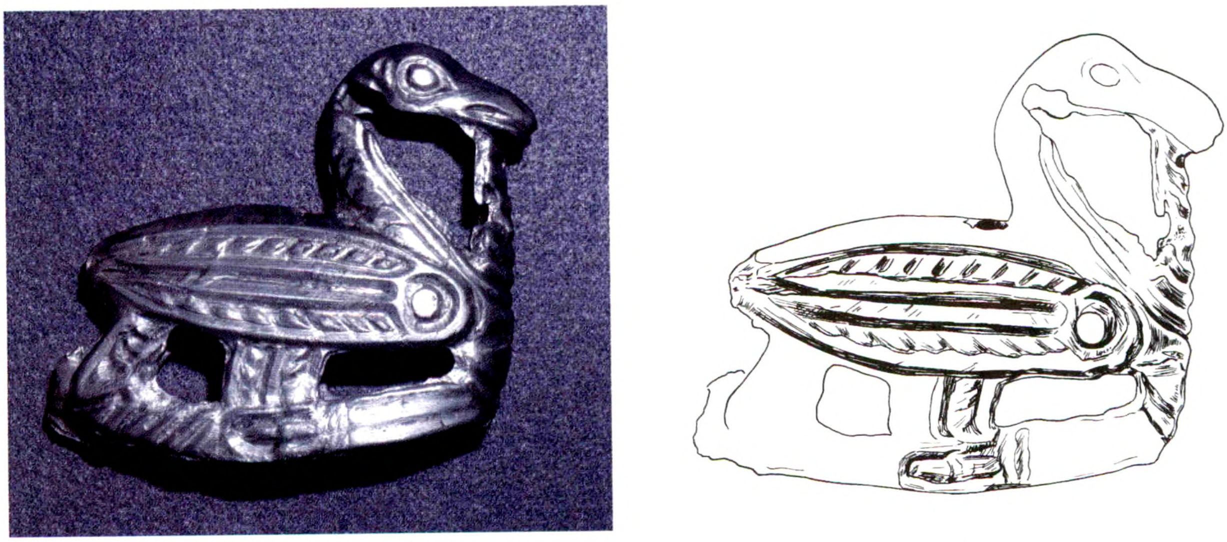


Fig. 4. Goat figurine.





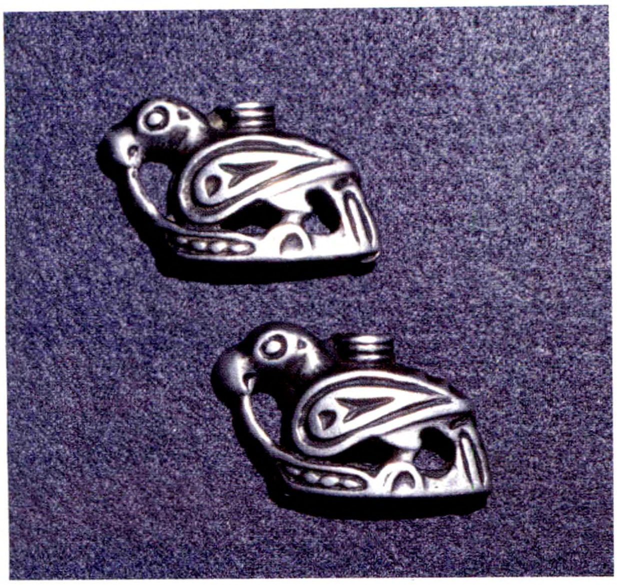
a

b

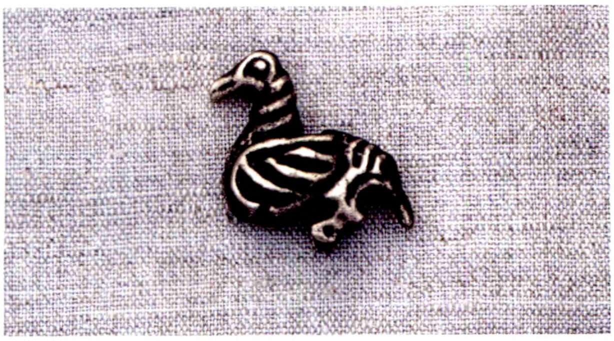
Fig. 6. Goose figurine.
a – general view; *b* – additional image (shaded).

believed to have had several appearances including that of a goose. In cases of emergency and danger, the hero turned into a goose and flew away: "Such a belief explained the reason why goose images made of gold, silver or other metal are so numerous among other sacred articles" (Gondatti, 1888: 18 – 19).

10, 11. Two bird figurines (materials of 2001). Polished silver figurines cast in a twofold mould with a core (Fig. 7, *a*). Their sizes are 4.5 × 2.8 cm. The bird is shown standing on an arch-shaped base coming from the bird's beak to its feet. The base is partly decorated with pearls. Fillets mark bird's wings and tail; the eye is outlined by a deep groove. A hollow pipe is moulded at the back of the bird. Horse figurines dated from the 9th – 12th centuries reported from the Ovgort station (Sokrovisha Priobia, 1996: 69) demonstrate similar decoration patterns on the manes and tails. V.N. Chernetsov (1957: plate XVIII, *6*) recorded a similar bird figurine from the Ishvarsky yurt village on the Malaya Ob. The articles described here were found late in 1930s in Yamgort station on the Synya in a hoard. The hoard also contains a silver rhyton (Baulo, Marshak, 2001) and about 20 bronze figurines including several horses. Recently, the owner of these bird figurines (Poslovy station, the Malaya Ob) has kept them in her *tutchan*, a sewing bag.



a



b

Fig. 7. Bird figurines.
a – from Poslovy; *b* – from Vershina Voikar.

12. A bronze bird figurine. Its size is 3.6 × 3 cm (see Fig. 7, *b*). The article was cast in a twofold mould with a core and polished. The eyes are outlined by a deep groove, the wings and feathers are shown with fillets. The back and the legs have hanging openings. Similar hollow pendants of the 6th – 8th centuries have been recorded from the Perm Province (Oborin, Chagin, 1988: 73). The article was found in a hoard. Recently it has been kept in a warehouse in a birch-bark box among other women's "sacred things" (Vershina Voikar station, the Voikar; materials of 2001).

13. A silver "eagle" figurine (Ovgort station, the Synya; materials of 2001). Its dimensions are 7.8 × 3.2 cm. The figurine was cast in a twofold mould with a core; the surface is polished. The article consists of a hollow pipe, in the middle of which there is a depiction of a bird. The pipe's ends are topped with perforated spheres. The pipe was decorated with a twisted cord design interlaced with prominent rectangles. The bird's talons form a ring; the wings and the tail are shown by fillets. The central wing area is decorated with a beaded pattern. The closest analogue to the present article is a hollow bronze pendant shaped as a bird figurine (though larger in size) dated from the 9th – 12th century, also found in Ovgort station (Sokrovisha Priobia, 1996: 68). The disclosure of these three silver figurines portraying birds (N 10, 11, and 13) is a unique find among other numerous medieval cast bronze items. Very few silver items have been attributed to the early cultures of the Lower Ob region (Ibid.: 78 – 79). These articles might have been cast of "sacred" silver for the existing nobility.

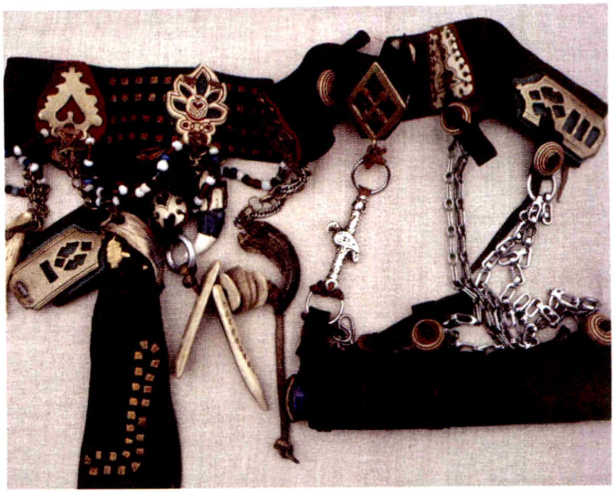


Fig. 8. Silver "eagle" figurine attached to the hunting belt.

This "eagle" figurine was found in a hoard in the second half of the 19th century. A great-grandmother of the present owner of this article went in a boat with her husband along the Synya from one station to another. Having landed, they noticed something glittering in the grass. They dug up the soil and discovered treasure: several brass cauldrons, a silver plate, the "eagle," and a "rattling" pendant (see below, N 15). Most recently this article has been used as an amulet for a hunting belt. It was inherited by the present owner from his father, and will be passed down to future generations (Fig. 8). The belt is usually stored on a "sacred" shelf in the entry-room (local tradition prohibits keeping at home things that have been obtained outside the house). This family's special attention to the bird figurine might result from the fact that the cuckoo is believed to be their family ancestor-protector.

14, 15. These two bronze pendants were found in two different treasure hoards. One of these pendants represents a bird. Its size is 2.3 × 2.5 cm (Fig. 9, *a*). The figurine was cast in a twofold mould with a core, and polished. The ornamentation was executed with fillets. A similar figurine of a "duck" dated from the 8th – 14th centuries was recorded from the Saigatino I sanctuary (Zykov et al., 1994: 97, N 144). The second pendant represents a rattling piece. Its size is 4.5 × 3 cm (Fig. 9, *b*). The main piece was cast in a one-sided sub-triangular mould. It exhibits three rounded holes for attaching chains in its lower portion, and one hanging hole in the upper portion. Such pendants were widely used in West Siberia during the second half of the first millennium AD (see, e.g., (Chernetsov, 1957: plate XXVIII, *1 – 5, 8*)). The pieces described here have most recently been used in ritual practice as decoration pieces and amulets for sewing bags (Vytvozhgort station, the Synya; materials of 2001).

16. A bronze anthropo-zoomorphic figurine (Vershina Voikar station; materials of 2001). The dimensions are 17.2 × 2.1 cm. The specimen was cast in a one-piece mould, and the sprue cap had not been removed (Fig. 10). Quite a few finds of this sort have been recorded to date. They are dated from the latest quarter of the first millennium BC (Zykov et al., 1994: 131). Other researchers estimate the age of such articles as the second half of the 1st millennium BC – the first quarter of the 1st millennium AD (Istoria severnoi tsivilizatsii, 2001: catalogue N 22, 24).

The shape of this article is reminiscent of that of a narrow fish with prominent fins and tail. At the same time, the article bears an anthropomorphic image – a human face wearing a helmet. The nose, eyes, mouth, and the outline of the headgear are shown with fillets. Apparently, the article represents an image of a "hero-fish," or that of the Water King, named *Vit-khon* in Ob-Ugrian mythology, a ruler of rivers and lakes. River estuaries, rocky rifts, and deep pools were linked with the cruel *Vit-khon* and his daughter *Vit-khon-Agi* in the Mansi and Khant religious perceptions. Sacrifices to the Water King were performed on high riverbanks, close to deep waters (Gemuev, Sagalaev, 1986: 101 – 103). The present image was found in an abandoned and partially ruined "sacred" warehouse. The figurine consists of a core spirit-protector image dressed in several gowns tied with belts. At the time of discovery, the fabric was severely decayed. From the bundle of rotten fabric, several silver and copper coins of 1752 – 1801 were disclosed, suggesting the time of the discovery of the major bronze image and its initiation into spirit-protector status.

17. A bronze zoomorphic figurine (Ovolyngort station, the Synya; materials of 2000). The northern taiga zone of the Ob basin, the 8th – 10th centuries. The size of the figurine is 10 × 2 cm. The piece was cast in a one-sided mould. The article represents a long animal figure (fish?) with a large head and short tail (Fig. 11). The spinal column is accentuated by a band of beads; the lateral sides exhibit ripples. In Mansi mythology, there are some figures combining the features of real animals and imaginary creatures (like the horned pike), mysterious inhabitants of deep waters having no personal names. Such creatures were named *kul*, 'devil,' or *yalpyng-ui*, 'sacred beast.' The latter creature was described as an animal with a long rounded body, pointed head, and a crest on the back (Ibid.: 103). The present bronze figurine seems to portray this imaginary creature inhabiting the deep river waters. Having been found long after its manufacture, *yalpyng-ui* was easily recognized and placed together with an offered piece of cloth among other "sacred" attributes in a cult warehouse. Such an image was prayed to for assistance in fishing and protection from accidents in rivers.

18. A bronze knife handle (Anzhigort station; materials of 2000). The size of the specimen is 10 × 3.5 × 1.5 cm. The implement was cast in a twofold mould with a core and polished (Fig. 12). This faceted implement demonstrates deliberate decoration – a prominent fillet in the middle, above it an ornamental design in the form of a petal with beads, and pseudo-twisted cords framing its rounded tip. The stopper shows the rusted remainder of an iron blade. The top of the handle is decorated with a bird figurine. Similar objects manufactured in the northern taiga Ob region in the 9th – 12th centuries were widely recorded in literature (Zykov et al., 1994: 91, 104; Sokrovischa Priobia, 1996: 59 – 63; Tylikova, Baulo, 2001: 132, etc.). In the past, pagan priests might have used such ritual knives and daggers ornamented with bird and animal figurines during the ritual sacrifices. Later these objects were uncovered in washed-out riverbanks or at ancient fort sites. People perceived such goods as weapons of legendary heroes and included them in their cult objects. The handle described here was kept at the bottom of a "sacred" trunk in a dwelling house.

19. A buckle showing a goat head and two fur-bearing animals (Yamgort station, materials 2001). A cast bronze piece (Fig. 13, *a*) sized 9 × 4.5 × 1.5 cm. An implement with a fixed spike was cast in a one-sided mould; its obverse side is polished. Three sides of the major part of the buckle are framed with a pseudo-twisted cord. The ornamentation pattern of the spike is considerably worn out. Similar belts depicting various animals were manufactured in West Siberia in the 8th – 13th centuries (Chernetsov, 1957: 207 – 208; Finno-ugry i balty, 1987: 319, 339; Zykov et al., 1994: 135 – 136, etc.). The Yamgort buckle, kept in a "sacred" trunk in a garret (see Fig. 13, *b*), served as the core of a spirit-protector's "head." This family patron was fed on holy days by bringing pieces of meat or fish close to the ghost's "face." As a result, the obverse side of this buckle was coated with a thick layer of fat.

20. A brass cast plaque (Khorier station on the Synya, materials 2000), sized 5.7 cm. The obverse side demonstrates three concentric circles (Fig. 14, *a*); the reverse is smooth. The reverse side exhibits an etched image of a seven-headed monster; below it there is a depiction of an unknown animal (Fig. 14, *b*). The remaining surface of the plaque shows numerous hatching signs, which likely represent signs of repeated magic rituals. A few similar bronze disc-shaped plaques, dated from the second half of the first millennium AD

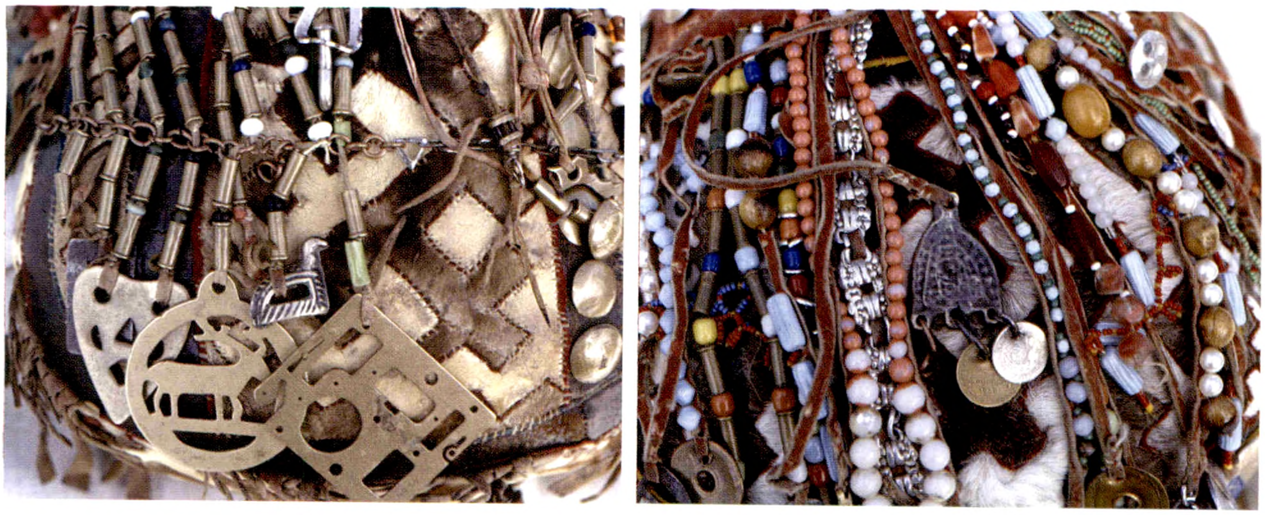


Fig. 9. Pendants from sewing bags.
a – bird figurine; *b* – rattling pendant.

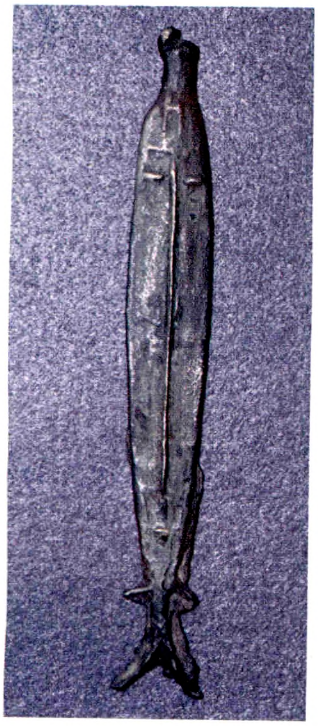


Fig. 10. Bronze image of the Water King.

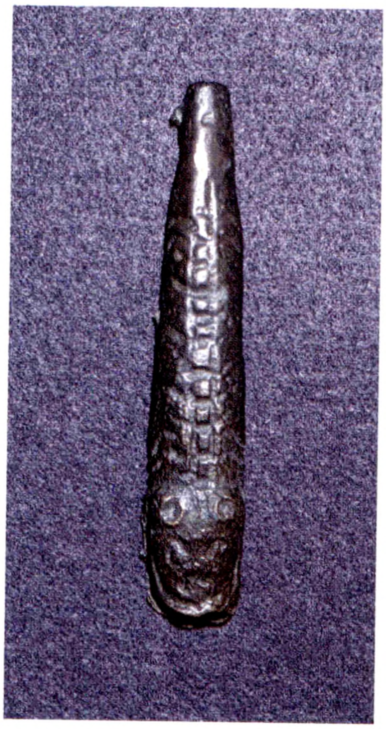


Fig. 11. Bronze image of *Yalpyng-ui*, a deep water resident.

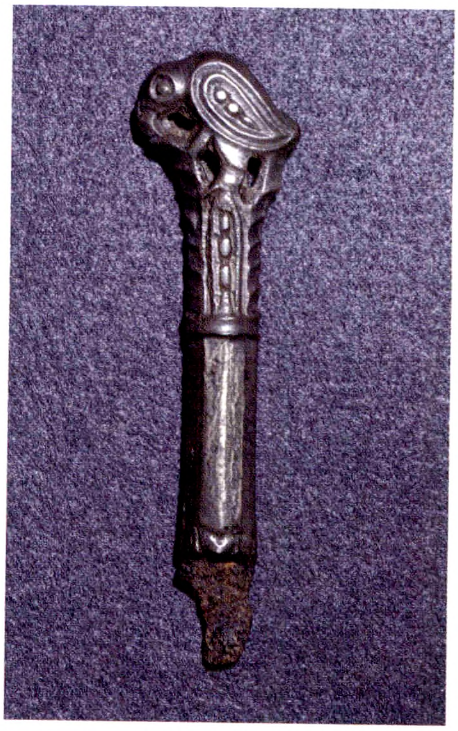
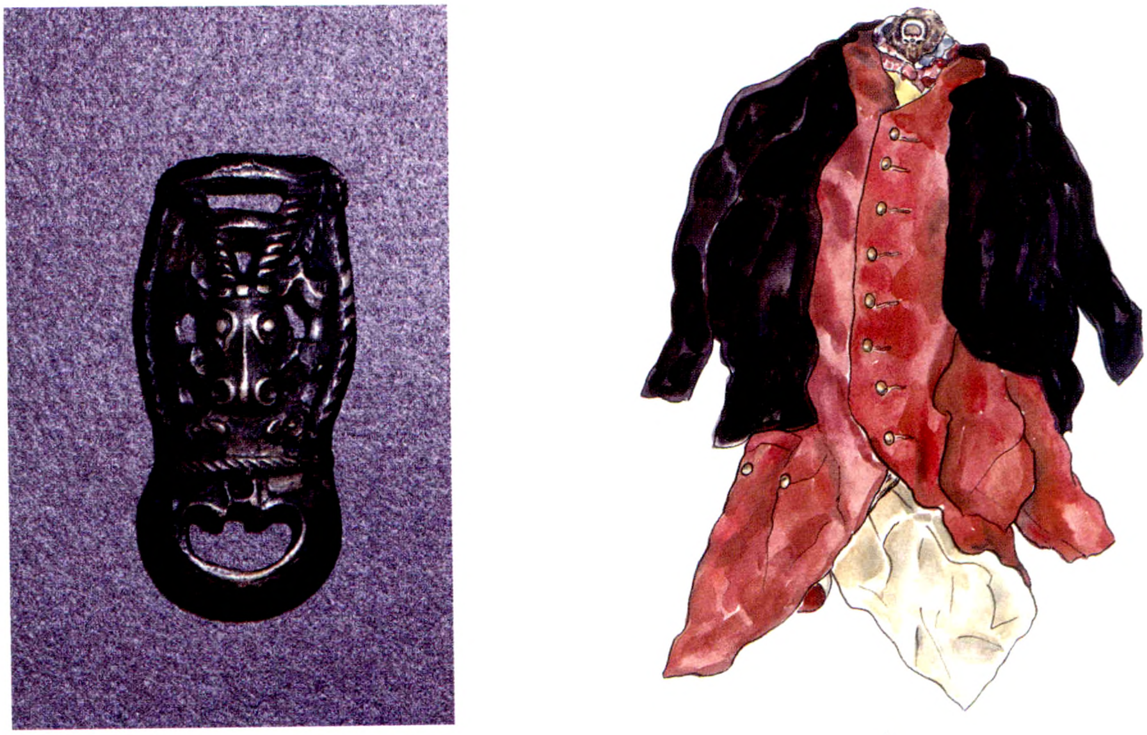


Fig. 12. Knife handle.

(the average diameter is 4 – 5 cm), were reported from Ust-Polui. These plaques were decorated with concentric circles, showing anthropo- and zoomorphic images etched on the reverse sides (Chernetsov, 1953: 135 – 137). The Khorier plaque demonstrates two perforations at the margins. Through one of these holes, the plaque was attached with a thread to a sacrificial shawl. The shawl with the attached plaque was kept in a cult warehouse together with other offerings to the local spirit-protector.

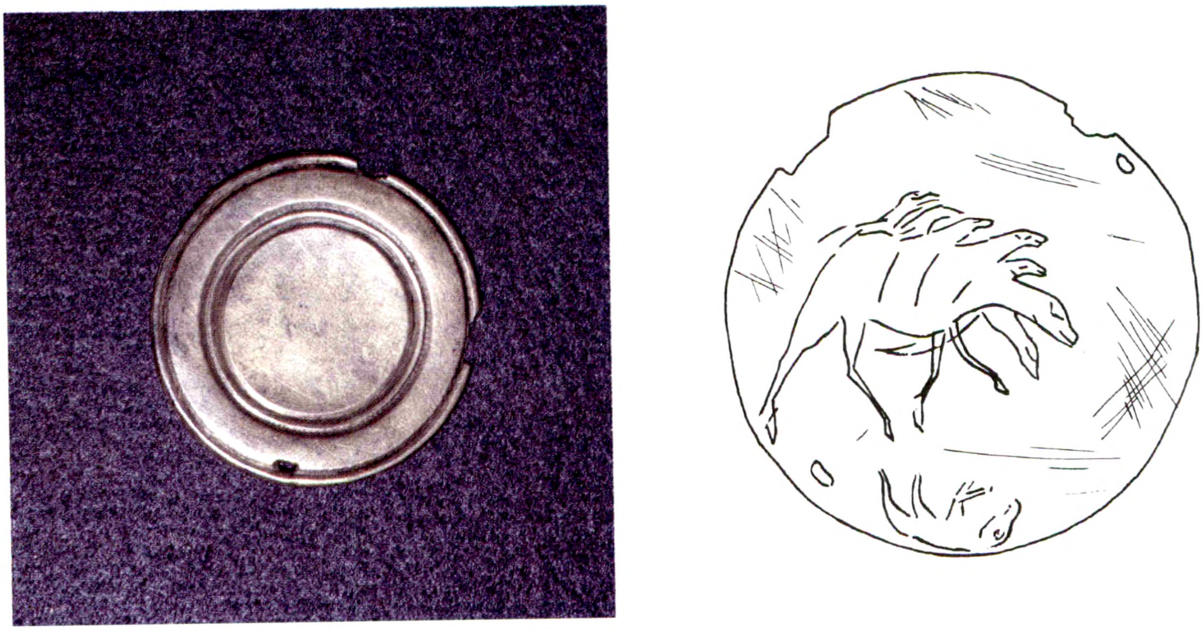
Conclusion

As it was mentioned above, the Ob Ugrian population has discovered many ancient articles of bronze and silver ware over the last two to three hundred years. The people perceived these findings either as proof of the existence of legendary ancestor-heroes, or as a heavenly message – a sign of luck or sympathy of heavenly forces for a particular individual. In any case, the usage of such goods



a b

Fig. 13. Image of a family patron.
a – bronze buckle, a core of the image; *b* – complete figurine of a family patron.



a b

Fig. 14. Brass plaque.
a – the obverse; *b* – images etched on the reverse.

was connected to family religious rituals. Some of these metal articles have been hidden in "sacred" trunks unseen by younger generations. Other articles, having been used as the cores of the images of spirit-protectors, still play an important role in the contemporary rituals of the Khanty and Mansi populations. The usage of various findings depends on many factors: the history of discovery, the image depicted on the article, etc. Some articles have been worshiped as images of gods (the horseman, "chief," bears, goose, "hero-fish," *yalpyng-ui*) or god's items (the knife handle). Other articles have been used as amulets in hunting belts or sewing bags (the silver "eagle," birds, horse-head and rattling pendants), or have served as additional gifts, making the whole offering more valuable (the zoomorphic pendant, goat figurine, brass plaque).

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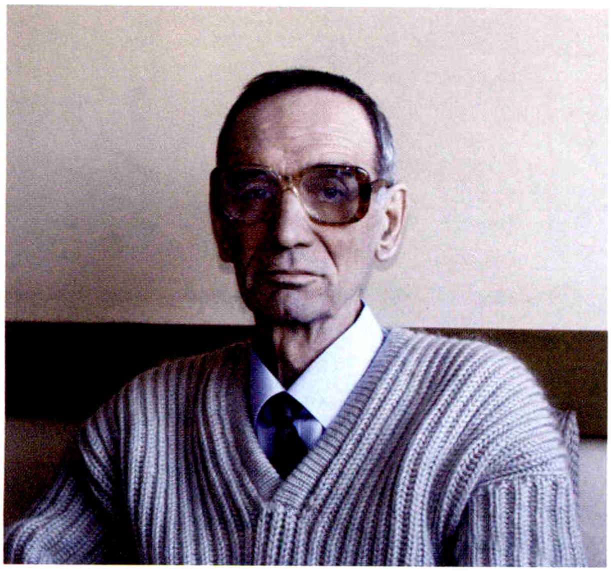
Izmail Nukhovich Gemuev



On June 1, 2002, Doctor of History Izmail Nukhovich Gemuev, a leading specialist in Siberian ethnology, will turn 60. His pathway to science was not easy. In 1962, he graduated from a military academy and became a regular officer ready to link his destiny with the army. However, his thirst for knowledge and passion for solving mysteries of the unknown lead him to the Department of History at Tomsk State University. After his graduation from the University in 1972, Izmail Gemuev taught history and political economy at colleges, and at the same time did his postgraduate studies at Tomsk State University. A prominent researcher of traditional cultures of native Siberians, Doctor of History G.I. Pelikh acted as his supervisor while he was doing his undergraduate and postgraduate studies. Following her, Izmail Gemuev joined the Institute of History, Philology and Philosophy, Siberian Branch of the USSR Academy of Sciences (Novosibirsk). In 1980 he defended his Candidate of History dissertation devoted to the family organization of the Selkups. Starting in 1983, Gemuev's research interests have been focused on the traditional worldview of the Mansi people inhabiting the Lower Ob River region. The Arctic Ethnographical Team established by Gemuev has covered the whole basin of the Northern Sosva, one of the largest Siberian rivers. In 1986, Gemuev (in co-authorship with A.M. Sagalaev) published a monograph titled *Religion of the Mansi People: Sacred Places. 19th – early 20th Centuries*. This book made a real sensation, since the authors managed to visit over a dozen unique sanctuaries and thoroughly analyzed this phenomenon in the Mansi traditional culture. A special part of this volume has been devoted to a reconstruction of the early religious practices of the Ob Ugrians based on comparative analysis of archaeological and ethnological data.

In 1990, Izmail Gemuev published the book *The Mansi's World Outlook: Home and the Universe*. In this book, the author astutely traced the connection between traditional ideas about the cosmology and cult attributes of Mansi dwellings, revealing the semantics of the images of gods and spirits and identifying the most important figures in the Mansi pantheon.

In 1991, Izmail Gemuev defended his doctoral dissertation and soon after was elected the Deputy Director of the Institute of Archaeology and Ethnography, Siberian Branch of the Russian Academy of Sciences (Novosibirsk). In 1992, a Department of Siberian Ethnographic Studies was created at the Institute; Izmail Gemuev has headed it since. He is still actively working in the sphere of higher education, holding an appointment as a professor at the Chair of World History at Byisk State Teacher-Training Institute.

From 1992 to 1995, Gemuev directed a scientific-commercial center established at the Institute of Archaeology and Ethnography. The selfless work of Gemuev and his colleagues has resulted in a well-organized tourist business in collaboration with German and Swiss partners, as well as archaeological and ethnographical exhibitions held in Japan, the Republic of Korea, Australia and other countries.

In 1998, I.N. Gemuev was given the title of Honored Scholar of the Russian Federation.

Nowadays Gemuev captains a major research direction: the study of ethno-cultural history of West Siberian indigenous people. He is an author and co-author of over one hundred scholarly works, including seven monographs. His investigations are of international importance, contributing a lot to the world Finno-Ugrian studies. Research analysis by Gemuev resulted in concrete recommendations for the revival and development of Siberian national cultures.

I.N. Gemuev is the Vice-Chairman of the Institute's Senatus Academicus and a member of the Dissertation Council. He is an associate editor-in-chief of such journals as *Archaeology, Ethnology and Anthropology of Eurasia* and *The Siberian Human Sciences* and also a member of the Presidium of the Russian Association of Ethnologists and Anthropologists.

Gemuev's colleagues at the Institute of Archaeology and Ethnography wish him health, longevity, creative success, and new exciting discoveries.

А.П. Деревянко А.И. Кривошапкин
В.Е. Ларичев В.Т. Петрин
ПАЛЕОЛИТ ВОСТОЧНЫХ ПРЕДГОРИЙ АРЦ-БОГДО
КАМЕННЫЙ ВЕК МОНГОЛИИ

Каменный век Монголии: Палеолит хребта Арц-Богдо. / А.П. Деревянко, А.И. Кривошапкин, В.Т. Петрин, В.Е. Ларичев. – Новосибирск: Изд-во Ин-та археологии и этнографии, 2000.

[**The Stone Age of Mongolia: The Paleolithic of the Arts-Bogd Mountain Range.** A.P. Derevianko, A.I. Krivoshapkin, V.T. Petrin, V.E. Larichev. Novosibirsk: Institute of Archaeology and Ethnography SB RAS Press, 2000. 152 pages, 85 illus. English summary, 8,996 words; French summary, 8,602 words. Price 12 US$ (including postage).]

ISBN 5-7803-0075-5

This monograph focuses on the archaeological materials assembled from the sites with the surface occurrence of artifacts located on the northeastern slope of the Arts-Bogd Mountain range in South Mongolia. The major topic of this publication is the description of the technical typological features of the noted archaeological collections. The available artifacts may be subdivided into two diachronic technocomplexes according to the state of their surface preservation. On the basis of established analogues with other Mongolian Paleolithic sites and taking into account the local paleoenvironmental data, the earlier technocomplex has been attributed to the Mousterian, while the later one belongs to the final Mousterian – Initial Upper Paleolithic. Comparative analyses of technocomplexes of various states of surface preservation have shown that the Upper Paleolithic culture in South Mongolia derived from the Mousterian tradition of the Levallois trend.

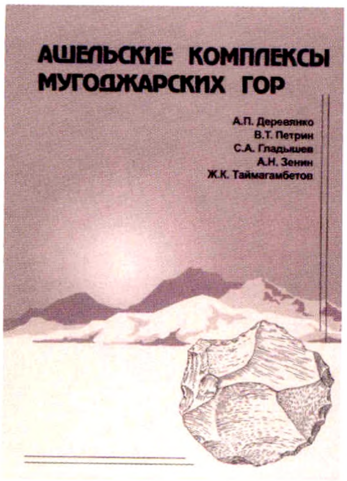
О.А. Артюхова А.П. Деревянко
В.Т. Петрин, Ж.К. Таймагамбетов
ПАЛЕОЛИТИЧЕСКИЕ КОМПЛЕКСЫ СЕМИЗБУГУ, ПУНКТ 4

Артюхова О.А., Деревянко А.П., Петрин В.Т., Таймагамбетов Ж.К. Палеолитические комплексы Семизбугу, пункт 4 (Северное Прибалхашье). – Новосибирск: Изд-во Ин-та археологии и этнографии СО РАН, 2001.

[**Artiukhova O.A., Derevianko A.P., Petrin V.T., Taimagambetov Z.K.** Paleolithic technocomplexes of Semizbugu, locus 4 (Northwestern Balkhash Lake Region). Novosibirsk: Institute of Archaeology and Ethnography SB RAS Press, 2001. 120 pages, 41 illus. French summary, 8,134 words. Price 10 US$ (including postage).]

ISBN 5-7803-0076-3

This monograph continues a series of publications dedicated to the major issues involved in the studies of the arid zone of Eurasia. The book is based on the Paleolithic materials obtained by A.G. Medoyev in the northwestern Balkhash Lake region during the period from 1960 to 1970. The unique materials in the book have been published for the first time and allow researchers to establish distinctive technical-typological features of the Kazakhstan Upper Paleolithic industries. The book provides the reader with a detailed analysis of the lithic artifacts that have been recovered from the site and subdivided into the Lower, Middle, and Upper Paleolithic series. Major emphasis is laid upon the description of the most numerous collection of the artifacts, whose common characteristic feature is a light state of surface abrasion. The authors have expressed their ideas on a gradual, evolutionary transformation of Middle Paleolithic industries into Upper Paleolithic ones, on the development of the Levallois technology into the parallel (laminar) reduction strategy, and on the original basis of development of the Paleolithic culture in the Balkhash Lake region. They prove their hypotheses with available evidence. The book contains inferences on the attribution of the series of artifacts demonstrating a light state of aeolian surface abrasion to the Initial Upper Paleolithic, and the age estimates of the whole technocomplex bracketing a wide chronometrical range from 50 to 35 ka ago. The volume is richly illustrated and contains numerous tables and a reference list.



Деревянко А.П., Петрин В.Т., Гладышев С.А., Зенин А.Н., Таймагамбетов Ж.К. Ашельские комплексы Мугоджарских гор (Северо-Западная Азия). – Новосибирск: Изд-во Ин-та археологии и этнографии СО РАН, 2001.

[**Derevianko A.P., Petrin V.T., Gladyshev S.A., Zenin A.N., Taimagambetov Z.K.** Acheulian Complexes from the Mugodjari Mountains (Northwestern Asia) Novosibirsk: Institute of Archaeology and Ethnography SB RAS Press, 2001. 136 pages, 60 illus. English summary, 3,341 words; French summary, 6,527 words; German summary, 3,968 words. Price 12 US$ (including postage).]

ISBN 5-7803-0074-7

This monograph sums up the current results of wide-scale investigations of Paleolithic sites in West Kazakhstan that have been carried out since 1993 within the framework of a research program on the Paleolithic studies in the arid zone of Eurasia. As a result of these investigations, a series of Upper Paleolithic sites with handaxes has been discovered in the Mugodjari Mountain range. The book focuses on the archaeological materials recovered from the sites Mugodjary 1 – 6 with the surface occurrence of artifacts. These sites yielded representative series of typologically distinct Acheulian bifaces and Levallois cores. Analyses of available data allow the researchers to establish functional specificity of the noted sites. The authors have advanced a hypothesis on the origin of the Lower Paleolithic industry in the Mugodjari as a result of early human migration from the Near East during the Acheulian period. The authors have traced similar features between the Mugodjary archaeological materials with those reported from Irtysh River basin, North Balkhash Lake region, Tyva, Mongolia, and the Caucasus. The authors attribute the Mugodjari Acheulian technocomplexes with bifaces to the same evolutionary trend as the assemblages recovered from such sites as Shakhbagata, Tanirkazgan, and Barykazgan.

Медведь в древних и современных культурах Сибири. – Новосибирск: Изд-во Ин-та археологии и этнографии СО РАН, 2000.

[**The bear in ancient and modern cultures of Siberia.** I.N. Gemuev, N.A. Alekseev, I.V. Oktiabrskaya (eds.). Novosibirsk: Institute of Archaeology and Ethnography SB RAS Press, 2000. 103 pages, 36 illus., 3 plates. English summary. Price 10 $ US (including postage).]

This collection of articles continues the series *Ethnology of Siberia*. The experience of the integration of archaeologists and ethnographers of the Siberian region – from the Urals to the Far East – is embodied in this volume. Based on a wealth of factual (archaeological, paleozoological, etc.) material, ranging from the Paleolithic to the Iron Age, as well as on unique samples of mobile art and petroglyphs, the authors trace the stages of the formation and transformation of bear images among the populations of Eurasia. The central section is devoted to West Siberian themes. In this section, the historical retrospective of the bear cult and the formation of the bear feast is reviewed in the context of the problem of cultural genesis of Ugrians and Samoyeds. The variety of beliefs and rituals associated with the bear is elucidated in the sections based on the ethnographic materials of the Evenks and Buryats, as well as the Ugric and Turkic ethnicities of Siberia. The articles put into scientific circulation the unique realities of the culture, language, and folklore. A separate section presents studies of the bear image in traditions of the Russian population of Siberia. The comparison of the Slavic and aboriginal cultures of Eurasia confirms the supposition about the universality of archaic ideas about the bear. In accordance with authors' reconstructions, the bear cult, although varying in details, includes universal ideas about the various forms of "relationship" between human being and animal. In the Siberian cultures, the bear – the master of taiga – is viewed as the personification of the whole animal kingdom and as a mediator between the human and natural worlds. Along with this, the mythical image of the bear is inseparable from ordinary conceptions of the earthly animal and real interaction with it. The novelty and originality of this book is determined by the complex approach to the multidimensional cultural complex associated with the bear that makes the present book a unique publication in Siberian studies.

Обозрение результатов полевых и лабораторных исследований археологов и этнографов Сибири и Дальнего Востока в 1994 – 1996 годах / Отв. редакторы А.П. Деревянко, В.Е. Ларичев. – Новосибирск: Изд-во Ин-та археологии и этнографии СО РАН, 2000.

[**Review of the results of field and laboratory studies carried out by archaeologists and ethnographers of Siberia and the Far East in 1994 – 1996.** A.P. Derevianko, V.I. Larichev (eds.). Novosibirsk: Institute of Archaeology and Ethnography SB RAS Press, 2000. 224 pages, 86 illus. Price 10 US$.]

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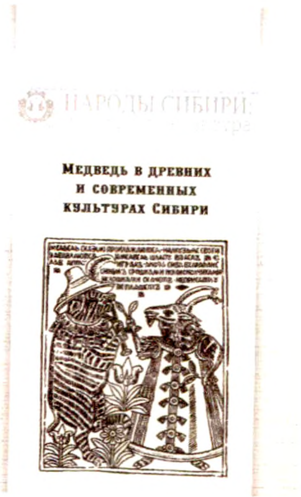

This article collection introduces the materials obtained during the 1993 – 1996 field and laboratory research on the cultures of ancient and modern peoples inhabiting North Asia and the Far East. It is the only complete collection of such materials concerning archaeological, ethnographical, and anthropological research over a vast territory of Asia – from the Urals to the Pacific Ocean, and from the Far North to the Altai and Mongolia. The studies are sorted geographically into the following chapters: "West Siberia" (the regions of Tomsk, Novosibirsk, Omsk, Tyumen, Kurgan; the Kuznetsk depression, and Gorny Altai); "Middle Siberia" (the Krasnoyarsk Territory, Khakassia, and Tuva); "East Siberia" (the Cis-Baikal and "Trans-Baikal regions, Yakutia); "The Far East"; "Foreign Archaeology and Ethnography", and "Information Technologies". Under consideration are the methods and results of excavations of multilayered sites, dwelling complexes, and cemeteries dated from different epochs, interdisciplinary research of cave sites, the problem of early bronze molding production, ancient petroglyphs of the Alati and Yakutia, experiments in archaeology, prehistoric art and paleoastronomy, new evidence of the medieval history of the Far East, ethnoarchaeology, the reconstruction of world outlook characteristic of Siberian ethnic groups, and others. The contributors trace the tendencies and peculiarities of the development of both Siberian indigenous and Russian cultures. The materials published greatly enlarge the source base of Asian archaeology and ethnology in a wide chronological span. Special attention is paid to the archaeological issues of other Asian countries. New archaeological data on the Paleolithic of Kazakhstan, Kirghizia, Lake Ubsu-nur (Mongolia), and the Early Neolithic of northeastern China are put into scientific circulation. Ancient Turkic sculptures recently discovered in the Mongolian Altai are under consideration. The volume contains diagrams, maps of archaeological sites, tables, and pictures of archaeological finds.

LIST OF ABBREVIATIONS

AN SSSR – the USSR Academy of Sciences

DVNC AN SSSR – Far Eastern Science Center of the USSR Academy of Sciences

DVO AN SSSR – Far Eastern Branch of the USSR Academy of Sciences

GANIIIYL – Gorno-Altaisk Research Institute of History, Linguistics and Literature (Gorno-Altaisk)

IAE SO RAN – Institute of Archaeology and Ethnography, Siberian Branch of the Russian Academy of Sciences (Novosibirsk)

IAHS – International Assosiation of the Hydrological Society

IGG – Institute of Geology and Geophysics, Siberian Branch of the Russian Academy of Sciences (Novosibirsk)

IIFF – Institute of History, Philology, and Philosophy, Siberian Branch of the USSR Academy of Sciences (Novosibirsk)

IIMK RAN – Institute of History of Material Culture of the Russian Academy of Sciences (St. Petersburg)

KSIA – Brief Communications of the Institute of Archaeology, Russian Academy of Sciences

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RAN – Russian Academy of Sciences

SB RAS – Siberian Branch of the Russian Academy of Sciences

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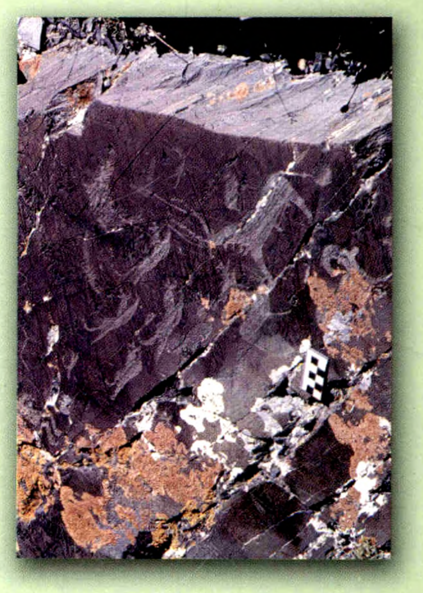

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PALEOENVIRONMENT. THE STONE AGE

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EVIDENCE OF MAMMOTH TUSK WORKING FROM THE MULTILAYERED PALEOLITHIC SITE OF LISTVENKA*

Introduction

Implements made of mammoth tusks have been the focus of Paleolithic studies in Siberia for 150 years, since the discovery of the Military Hospital site in Irkutsk. The most impressive mammoth tusk implements presently known were recovered from the sites of the Malta-Buret Culture in the western Circum-Baikal area* and from the Ust-Kova site in the northern Angara River region (Gerasimov, 1935, 1941; Vasilievsky, Drozdov, 1983; Vasilievsky, Burilov, Drozdov, 1988). The middle reaches of the Enisei River have yielded few implements on mammoth tusk. This is a surprising phenomenon because numerous finds manufactured from deer antler testify to a high level of bone technology development (Abramova, 1979a, b; Auerbach, 1930; Sosnovsky, 1934). Rich archaeological materials from the Listvenka site, in the Enisei region, provide investigators with a unique chance to study the Paleolithic technology of mammoth tusk working (Arkheologia..., 1992).

Description of the Listvenka site

This multilayered site is located 40 km southwest of the Krasnoyarsk City, on the outskirts of Divnogorsk. It lies on the right bank of the Listvenka-Zarechnaya River, which is a right tributary of the Enisei (Middle Siberia, Krasnoyarsk Province, 56° N). Listvenka was discovered in 1982. Investigations of the site were carried out by the joint team of the Krasnoyarsk Pedagogical University and the Novosibirsk Institute of Archaeology and Ethnography. The team was headed by N.I. Drozdov during the 1983 – 1986 field seasons and by E.V. Akimova from 1987 – 1997. A total of 25 culture-bearing horizons (designated by numbers from 1 to 20 with additional designation in Russian alphabetical order for sub-layers) was established in a stratigraphical sequence of interchanging sand and siltstone layers, probably part of an ancient terrace of the Listvenka-Zarechnaya.

The excavation trench 3 revealed the following stratigraphic sequence (after V.P. Chekha) (Ibid.) (Fig. 1).

Stratum 1. Surface layer of the podzol soil from 0.5 to 1.0 m in thickness.

Stratum 2. Fine grained, ferrous, non-carbonaceous sand varying in thickness from 0.4 to 0.8 m.

Stratum 3. Light gray to whitish, dusty, carbonaceous, loamy sand. Certain portions of this stratum exhibit vague, slightly dipping laminations. The lowermost portion of this stratum is fissured with ice wedges with pseudomorphs. These formations consist of two layers and are about 2 m deep and about 1 m wide at their upper portion, penetrating into the sediments of strata 4 and 5. Culture-bearing layers 1 and 2 have been established within the boundaries of stratum 3, which is 0 2 to 1.0 m in thickness.

Stratum 4 represents an intercalation of gray, fine-grained sand and siltstone laminations. These undulating, discontinuous laminations reveal lenses of variably grained sand and whitish loamy sand. The stratum is

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*. This work has been done under the financial support of the Russian Foundation for the Humanities (Project N 98-01-12018в)

** This culture was identified on the basis of materials recovered from the Malta and Buret sites in the 1920s and 1930s (Gerasimov, 1935, 1941; Okladnikov, 1940) It is characterized by a lithic industry based on medium-sized blades shaped into points, knives, and burins with scalar retouch along most of their perimeters The major tool types of this industry also

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dipping to the west at angles varying from 10° near the bedrock to 3° further into the terrace deposits. The noted thickness varies from 0.4 to 0.7 m.

Stratum 5 is an interstratification of gray and yellowish-gray, fine- and small-grained sand, and siltstone. Unlike stratum 4, the undulating laminations are continuous, though their borders are less distinct. The stratum is dipping to the west at angles varying from 7° at the portion adjoining the bedrock to nearly horizontal in the western portion of the profile wall. The noted thickness varies from 1.2 to 1.4 m. Culture-bearing layers 4 – 8, lying in conformity with stratigraphic subunits, have been established within this stratum.

Stratum 6 reveals a sequence of laminae containing gray, light gray, and yellowish-gray, fine- and small-grained sand and siltstone. The upper portion of this stratum shows homogeneous sediments, while the lower portion exhibits clear and dipping laminations that become horizontal in the central portion of the profile wall. The average thickness of laminations is between 0.5 and 1.5 cm. The laminations reveal sediments of a different structure: bluish-gray silty loam, variably grained, and well-washed sand and gravel, up to 10 cm in thickness. The eastern portion of the profile wall adjoining bedrock shows additional short laminations and lenses of debris and gravel. Solitary ice wedges noted within this stratum were 5 to 30 cm wide and up to 2.6 m long. Eleven layers bearing cultural remains of the Upper Paleolithic were identified and they lie in conformity with sterile sediments. The overall thickness of stratum 6 is 3.0 m.

Stratum 7 consists of detritus, pebbles, and small cobbles of granite-like rocks and hornfels filled with well-washed, small fractured gravel and sand. These poorly sorted sediments lie in roughly horizontal laminations. Sediments of stratum 7 underlay the sand-siltstone culture-bearing unit and delimit its extent in the west portion of the profile wall. The noted thickness is greater than 1 m.

Accumulation of the lowermost portion of the sand-siltstone unit likely occurred in a basin of flowing water. This supposition is supported by the well-washed and sorted texture of the sediments and the noted lamination structure of deposition. The upper portion of the profile wall is apparently composed of dilluvial sediments (strata 5 – 3).

The site is located on top of the ancient spit formed by the Enisei tributary. The river is surrounded by rocky cliffs, providing a convenient location for hunting large gregarious animals that populated the forest-steppe zone. Nearly 90% of the noted skeletal remains at the site have been attributed to bison.

Mammoth tusk implements

Mammoth skeletal remains, including solitary bones and large articulated skeletal fragments belonging to at least

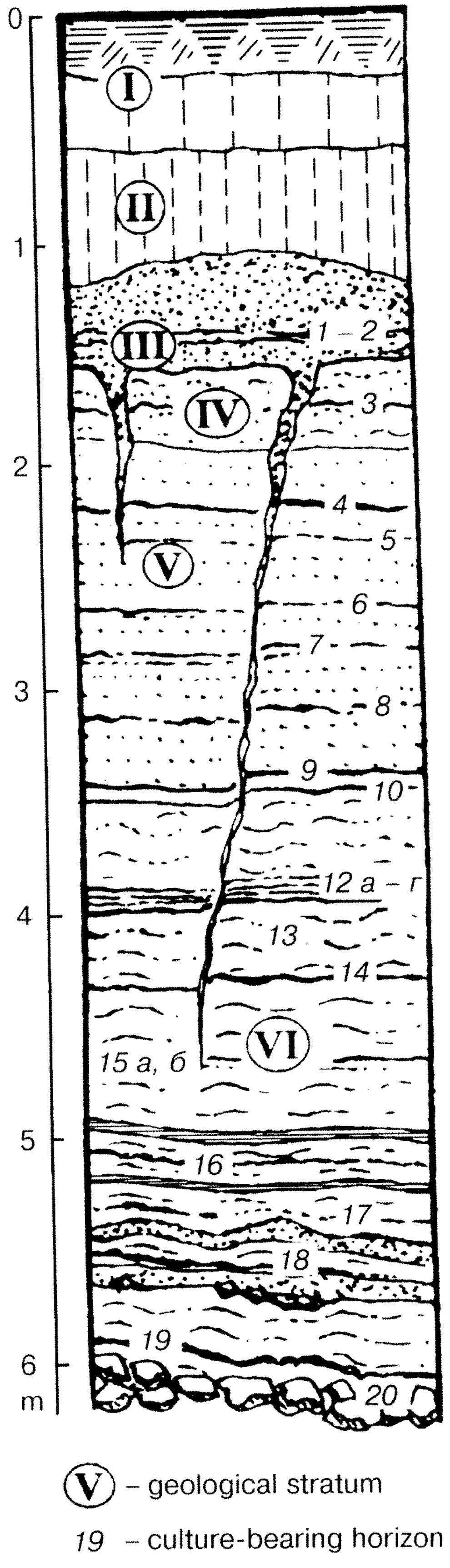

Fig. 1. Generalized stratigraphic column of Listvenka.

two individuals, have been recovered only from the lowermost culture-bearing horizons 19 and 20. Overlying layers yielded quite few fragments of mammoth tabular bones, massive and heavily mineralized, demonstrating a different state of preservation in comparison to the other faunal remains. A few tusk fragments were also recovered from culture-bearing horizons 15A and 12Г, while tusk implements were associated with culture-bearing horizons 19, 12Г, 10, 7, 4, and 2.

According to the latest data, mammoth populated the territory of the Krasnoyarsk Province until at least 13 thousand years ago. The Listvenka area has produced reliable evidence of mammoth habitation dating no later than 16 thousand years ago. Hence, ancient humans might have obtained mammoth bone and tusk fragments from older deposits and transported fresh tusks from elsewhere to produce implements of this precious material. Apparently they might have found previously manufactured tusk implements and used them for their own purposes.

In the course of excavation of 1992 – 1993 and 1996 – 1997, a large economic zone with a stone pavement was excavated in association with culture-bearing horizon 19. This zone has been classified as an occupation site – a workshop containing separate zones where stone, animal skin, and tusk processing took place. The site yielded an abundant collection of lithic and mammoth tusk implements (Akimova, 1995; 1998). This layer produced a ^{14}C date of 16,640 ± 350 yrs BP (SOAN-3734).

The lithic industry recovered from horizon 19 was based on small and medium (2 – 7 cm) sized blades and blade-like flakes. The major tool types identified include burins, scrapers, microblades serving as in-laid parts for composite tools, as well as various scraping, cutting, planing, and notched tools. Blades were removed from single platform cores bearing heavily convex flaking surfaces. The method of flaking from the narrow faces of cores was also noted, though no wedge-shaped cores were recovered (Gorelchenkova, Poplevchenko, 2000).

The southern portion of this occupation site was investigated in 1996 – 1997 and yielded more than 200 fragments of worked mammoth tusk. Most are rather small fragments demonstrating a variety of methods of mammoth tusk fracturing. These include classical flakes with rippled surfaces and scars of removal. The cross-sections of such implements show that the medial portion is thicker than the edges. Also, massive, narrow tabular pieces with straight, vertical lateral sides were probably produced through preliminary tusk notching in order to shape the outlines of a future blank. Some large pieces were split lengthwise. Tusk fragments bearing cut marks and fissure surfaces were also recovered. The share of large tusk spalls with a preserved surface layer is only minor. The established zone likely represents an area where a mammoth tusk was reduced until the complete exhaustion of the initial large fragment, though it is not suggestive of a scarcity of raw material at the site.

Many tusk fragments bear traces of planing, cutting, polishing and edge hewing. Tusk fragments with short (up to 3 cm), straight, V-shaped grooves represent a unique artifact type. The purpose of these grooves is not known. There is one specimen with grooves cut from the opposing ends on both surfaces (Fig. 2, *13*). Similar, though considerably smaller and narrower grooves were noted on two points (Fig. 2, *10, 12*).

The total collection of horizon 19 comprises 18 mammoth tusk implements of varying completeness and states of preservation.

Ten point fragments were noted with ovoid and ovoid-sub-rectangular cross-sections. Most of them were intensively shaped from tusk blanks and polished over their entire surfaces or considerable parts of them (Fig. 2, *3 – 5, 9 – 11*). Fragments do not exceed 5.5 cm in length (the only exception is the 12 cm long specimen), while their maximum width is between 3 and 5 cm. The only complete point is 9 cm long. It was fashioned on a thin blade (see Fig. 2, *9*). The tip of the point demonstrates signs of polish. Similar points ("awls") were reported by M.M. Gerasimov (1941) from Malta.

A unique implement reminiscent of an anthropomorphic image (Fig. 2, *7*) was fashioned and partially polished on a large tusk blank. One of the surfaces seems to show a slightly protruding abdomen and long legs; a deep angular cut accentuates a groin. The opposite surface likely represents a back slightly concave at the waist. The lower portion of the back surface bears two disconnected grooves. If they were one line (assuming the two grooves are a technical error, and should be only one groove), it may be taken as a feature showing two legs. Gender features are not accentuated. The upper portion of this "statuette" (at an assumed shoulder-girdle) was broken, presumably during the course of its manufacture. The length of this artifact is 19.7 cm, and its width and thickness are 3.4 – 1.3 and 1.8 – 1.1 cm respectively.

Two noteworthy artifacts form a separate set. These artifacts were found 6 m apart from each other. Both artifacts display similar shapes but differ in size and in their states of preservation. The first artifact of this set is reminiscent of hare's metapodium in shape and in size (6 cm long). One of its "epiphyses" is rounded in shape and ovoid in cross-section (1 × 1 × 0.5 cm) (Fig. 2, *1*). A joint between the head and the main body (a "neck") is smooth and slightly asymmetrical. This artifact was preliminarily identified as a button or a fastening element. The second artifact within this set (a blank fragment?) represents the head itself, with its noted dimensions close to those of the first artifact (2.1 × 2.3 × 1.4 cm) (Fig. 2, *2*). The "neck" portion shows similar asymmetric features to the first artifact. This piece may be interpreted both as

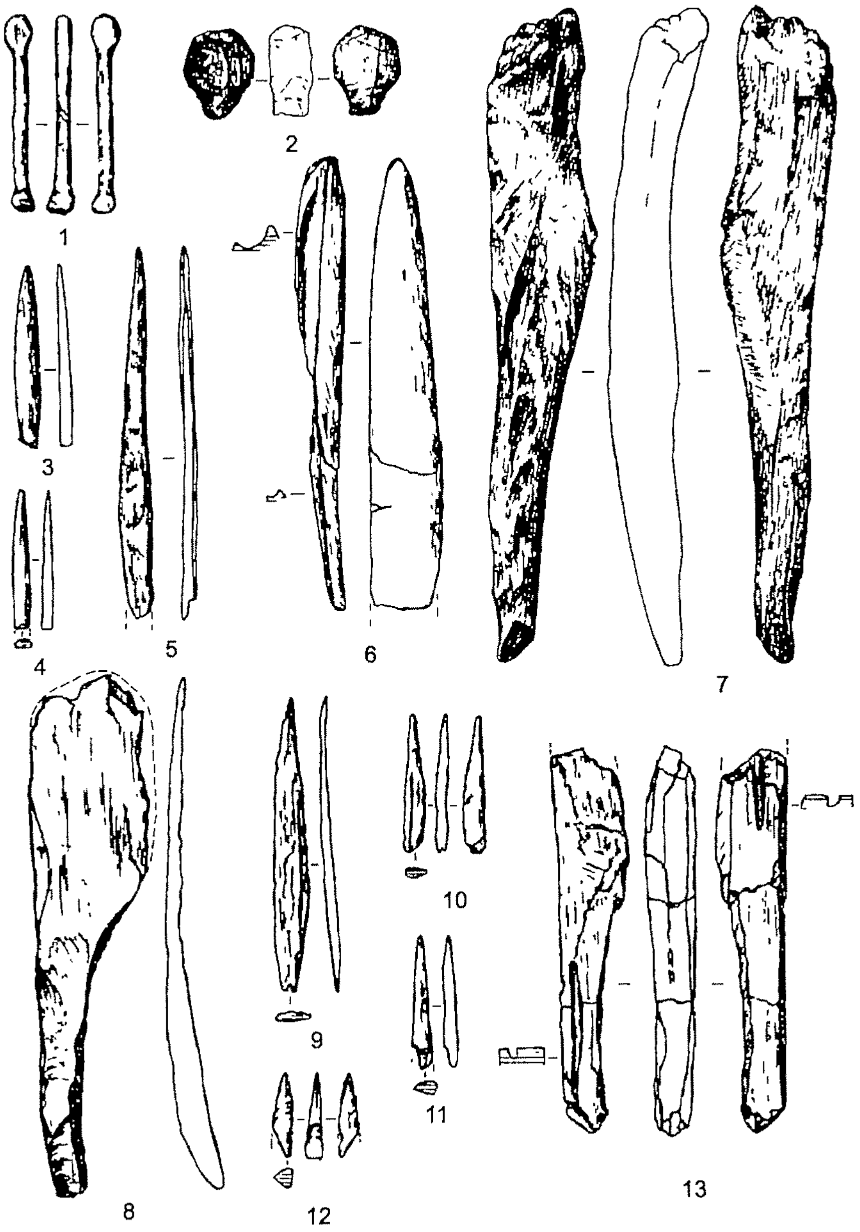

Fig 2. Mammoth tusk implements from culture-bearing horizon 19 at Listvenka
1 – "button", *2* – fragment of an anthropomorphic image ("head"), *3* – *5*, *9* – *12* – points, *6* – fragment of a spearhead, *7* – anthropomorphic image (?), *8* – "spade", *13* – tusk fragment with grooves

a massive button and as a fragment of an anthropomorphic image, probably by the same master who produced the aforementioned statuette.

An implement shaped as an asymmetric spade on a long massive shaft (Fig. 2, *8*) was manufactured on a large tabular flake detached from the tusk surface. The implement is 32 cm long, the width and thickness of the working part are 7.5 and 1 cm respectively. The shaft varies in width from 4 to 1.6 cm and is 2 cm thick. The surface of this implement, especially its back surface, is nearly completely cemented with a layer of carbonaceous sand. Sand was also traced under the thin surface layer exfoliated from the main body of this spade, which caused a visible transformation of its original shape. Presumably, the original shape of the working element of this implement was asymmetrical and oviform; the edges were likely clear-cut and polished. The contemporary state of surface preservation does not allow identification of the origin and features of the polishing. However, the convex surface of the spade and its smooth edges suggest a skin processing function for the implement. The working edge of the spade is not even; it has two protrusions probably representing mechanical damage. The shaft of the spade bears wide and pronounced scars on the back and lateral surfaces. The frontal surface demonstrates signs of transverse scraping (cutting?). The tip of the shaft was formed as an asymmetrical wedge (lateral view).

A diagonal piece of a cone shaped, polished implement has been interpreted as a fragment of a spearhead (14 × × 2.2 × 2.2 cm) (Fig. 2, *6*). The tip of this implement is blunt, showing clear signs of damage. A flute goes along the whole length of the spearhead. The flute has a segment-shaped cross-section and its dimensions vary from the greatest at the tip (8 mm wide and 5 mm deep) to 3 and 1.5 mm respectively at the broken end.

Certain tusk fragments and exfoliated tabular pieces can be refitted into indefinable tool blanks and into a fragment of an implement with a cone-shaped, polished tip.

Data on the spatial distribution of artifacts within a cultural layer provide important additional information. The spade was found near the "wall" on a stone weighted down by another stone. The spearhead fragment and the statuette blank were found stuck into the soil close to the central pit. The points, the "head", and grooved fragments were dispersed over the zone with abundant waste and products of stone working.

It should be noted that most pieces of worked mammoth tusk were found concentrated around a small pit roughly oviform in outline (90 × 65 × 18 cm). The

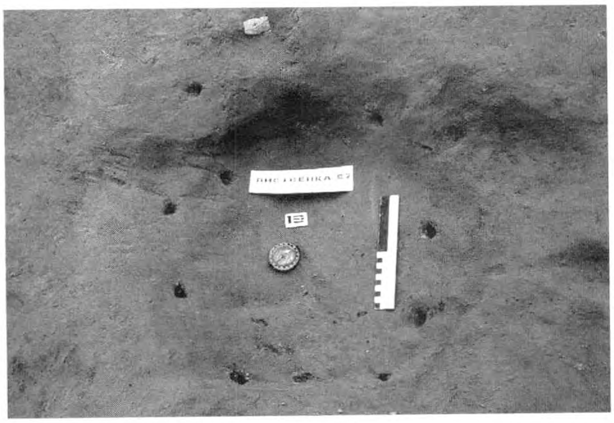

Fig. 3. Small pit for tusk maceration from culture-bearing horizon 19 at Listvenka.

walls of the pit form irregular ledges. The pit was filled with loose sandy loam sediments and contained a few pieces of charcoal. Filling of the same texture was noted all over the adjacent area. No signs of a hearth or burnt soil were traced. The northern portion of the pit revealed a thin lens of ocher. The bottom of the pit was uneven. The sloping walls yielded a large fragment of mammoth's ulna, a vertebra fragment, and tusk spalls as well as two fragments of bison's ribs. Screening of the pit filling revealed a few flakes, chips, and small, bone and tusk fragments. The major feature noted in the pit was the presence of 13 cone-shaped small holes about 2 cm in diameter and between 1.5 and 4 – 9 cm deep. Outlines of these small holes were apparent against the contrasting background of the intact floor of the pit due to a gray coloration of the filling (Fig. 3, 4). Most holes were noted in the upper portion of the pit or along its edge. Certain regularity was apparent in the distribution of these holes. The area delimited by a series of holes was trapezium-shaped and resembled a skin of a small animal (hare?) stretched over a concave surface of the pit and fixed with sharp pegs that were driven into the walls of the pit. Two unclear tracks suggest that certain pegs may have been rearranged (in order to change or adjust the skin).

Apparently, this hollow pit can be interpreted as neither a storage nor a hearth pit. The hollow pit covered with skin or leather may have been used as a water tank in the course of mammoth tusk working. In this case, the anthropomorphic figurine and a burin (Fig. 5, *2*), both stuck into the soil at the northern border of the pit, may be taken as evidence of their being "in the process of working".

The suggested purpose of the pit may also explain the function of the fragment of a massive, cone-shaped, fluted point, which was uncovered protruding from the soil in a vertical position in the immediate vicinity to the northern border of the pit. The strange position of the fragment may be explained by its possible use as a peg which, unlike potential wooden specimens, has been preserved.

The lithic collection of culture-bearing horizon 19 is comprised of more than 20 burins and cutting tools fashioned on blades and flakes, 10 borers, and about 300 various retouched flakes, blades and microblades. The area of the site revealed clear zones of particular activities linked with skin processing or stone and tusk working. Many lithic tools demonstrate clear signs of use-wear. Thus, we may infer that most tools were used for tusk working (Fig. 5).

Solitary mammoth tusk fragments were also recovered from culture-bearing horizons 15A and 12Г. In the event of a shortage of raw material, its value for ancient artisans increased. The collection from culture-bearing horizon 19 demonstrates an intensive working of implements and the choice of a specific implement "deserving" of such a rare raw material.

In 1991, a specific implement made of mammoth tusk and recovered from culture-bearing horizon 12Г* has been classified as a *bâton de commandement* (Fig. 6) (Akimova, Sidorenko, 1992). The baton is symmetrical, long, and flattened; its edges and ends are "gently" rounded. This implement was fashioned on a large piece of tusk that was diagonally cut and probably straightened. The length of this implement is 43 cm, and it has a width of 6 – 9 cm and a thickness between 2.5 and 3 cm. This long and massive baton demonstrates perfect form and fine workmanship. The surface of this specimen shows negative removal scars and consequent polishing. One of its surfaces is slightly convex, while the opposing is flat. The middle portion of its convex surface shows shallow signs of direct blows. Due to depositional conditions, the flat surface is not so well preserved as the convex face. Three bi-conic perforations are located along the long axis of the implement. The first rounded (1.8 × 1.8 cm) perforation was made at the narrow end of the baton; signs of rough working with the help of some cutting instrument are evident on the surface. The second oviform perforation (3.7 × 2.5 cm) is located close to the first hole. The third perforation, with a circular, slightly elongated form (4.2 × 3.5 cm), is located at the wide end of the baton. The walls of the second and third perforations are completely polished.

Traditional "batons" made of red deer or reindeer antler are widely known from many Paleolithic sites in Europe and Siberia (e.g., the sites of Afontova Gora II and III, Kokorevo I and III, Novoselovo VII, Bolshaya Slizneva, and Listvenka located in the Enisei River valley) (Sosnovsky, 1934; Abramova, 1979a, b; Arkheologia..., 1992). Batons recovered from these sites usually have one oviform or rounded hole located at the supraorbital outgrowth. Tusk was rarely used for manufacturing such tools (Kostenki XXI). Implements of this type were usually supplied with a long haft, probably for the purpose of resting the entire implement in wood (Paleolit Kostenkovsko-Borshevskogo raiona..., 1982). However, the baton from Listvenka does not have such a haft, a characteristic which, together with three perforations of different sizes, makes the form of this implement unique. The "batons" are usually regarded as implements for straightening spears, javelins, holders for lithic parts of composite tools, etc. (Semenov, Korobkova, 1983). The tool itself or the operation performed using such implements might have been linked with certain rituals during the Paleolithic. This may be the reason for the decoration of such objects with patterns and animal images, as recorded on many batons from West Europe. The implement under discussion was made of a labor-intensive raw material, a trait which might signify the special character and function of this object in the

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* ^{14}C dates of 13,100 ± 410 yrs BP (GIN-6965), 13,470 ± 285 yrs BP (SOAN-3733), and 13,900 ± 400 yrs BP (SOAN-3833) are available for this horizon.

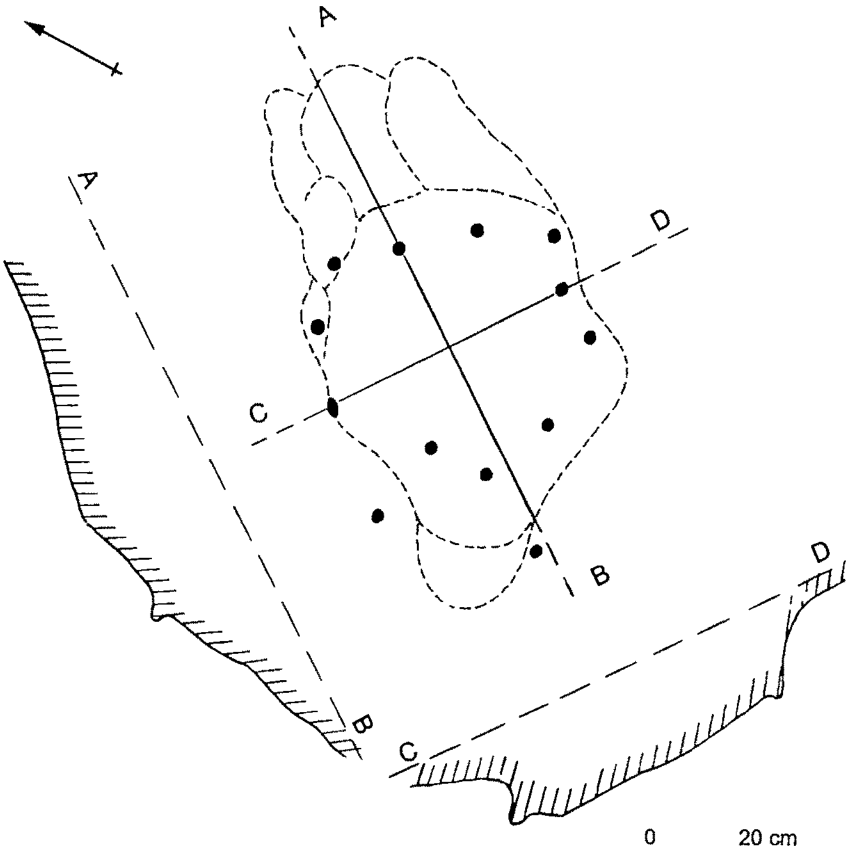

Fig. 4. Plan and profiles of the small pit from culture-bearing horizon 19 at Listvenka.

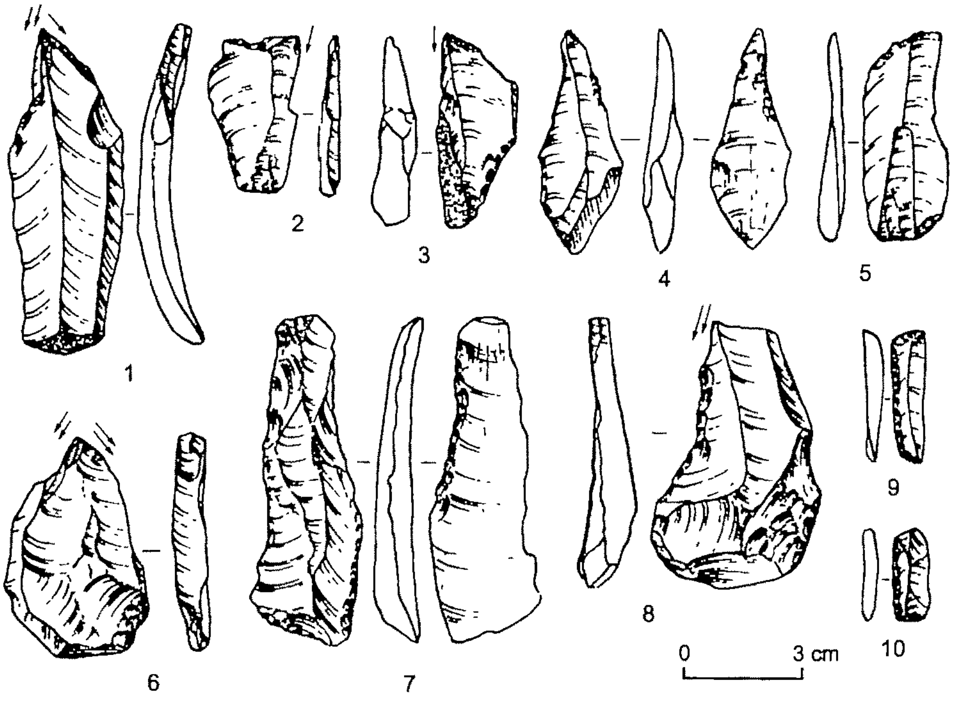

Fig 5. Burin-like and cutting tools from culture-bearing horizon 19 at Listvenka

past. This is not the only original feature. The location and variability of three holes on the main body, the "spare" portion bearing use-wear signs, the apparent absence of any haft for manipulating this object and for applying physical force, as well as the absence of use-wear signs left by a wooden haft should it be inserted in the hole, are all characteristics that add to the uniqueness of this object.

A mandible of a child of *Homo sapiens* was recovered from culture-bearing horizon 12Г. A hearth from the horizon, delimited by vertical flat stones, yielded bison teeth and bone fragments in an unusually good state of preservation. A set of three small hearths of roughly similar sizes was noted 1 5 m south of the baton. The three hearths were located one by one along the north-south line. A concentration of fractured tusk was found in association with these hearths. A few of the tusk fragments bear cutting and abrasion marks. This concentration also produced a fragment of some large implement (working methods are similar to those noted on the baton), a fractured "head" (4 × 4 × 4 cm) representing a roughly worked blank of a globe-shaped implement (or an implements with a globe at one end), and a small cone-shaped fragment bearing cut marks on both fractured ends.

The lithic collection recovered from horizon 12Г comprises large tools, massive flakes and blades serving as tool blanks. The tool kit of a clearly Afontova type (massive *racloirs* and rounded *grattoirs*) includes sets of points on blades, large dihedral burins (Fig. 7, *1*, 2), microblades serving as in-laid parts for composite tools without traces of secondary working. The tool kit also includes flat ("Kokorevo" type), grooved tools made of horn, demonstrating a combination of straight and wavy ("Afontova" type) lines on the surface.

Culture-bearing horizon 10 produced a lithic industry that includes *grattoirs*, points, and double multifaceted burins on large blades, all representing clear characteristic features of the Kokorevo Culture*. The only mammoth tusk implement recovered was a perfectly rounded small spike with a long, narrow "nose". No signs of polishing have been traced. The surface of the spike shows distinct longitudinal marks left by a burin. It is noteworthy that this spike was found *in situ* in a vertical position north of the hearth, in an area yielding very few finds. The lithic collection assembled from the area southeast of the hearth suggests that the zone may have been used for animal skin and bone processing. In this case, the spike may have been used as a peg to fasten a stretched-out animal skin to the ground.

Culture-bearing horizon 7, dating to about 13 thousand years ago, produced a set of bone implements: a grooved implement made of bone with a *pièce esquillée*, an awl fragment, three needle fragments, and specific mammoth tusk object reminiscent of a dagger. In addition, a few fractured tubular bones and solitary flakes were assembled from this zone. The specific tusk object has an elongated and curved shape (29.7 × 3 × 0.9 cm), with a trapezium-shaped base at one end of the implement and a long narrow sharp tip (Fig. 8). The convex edge bears an unusually deep and wide groove (up to 5 × 3 mm), apparently not meant for holding standard microblades. Most of the object's surface was treated with the help of a large lithic tool, probably a push-plane with a concave working edge. This treatment is implied by the transverse ribbing on the dagger's surface. One of the surfaces was intensively polished so that ribbing was eliminated. The sharp end was also polished on the opposing, convex face. The polished area occupies up to ¼ of the total length of this implement. The surface close to the base, cut out to form a clear trapezium, bears signs of planing in order to smooth the sharp outlines of this implement. The end of the basal part was cut and fractured. No polishing marks are traced. Elaboration of working methods suggests an attribution of this dagger to the category of ritual objects. However, it was found outside activity zones, at the area of about 4 sq. m where broken and worn out objects were scattered. The dagger might have been discarded because of exfoliation, though this does not explain the concentration of bone waste in one particular area.

The sparse lithic collection recovered in association with this horizon does not include tools for tusk and horn working. Large cutting tools on blades are dominant in the tool kit.

Culture bearing horizon 4 has been attributed to the Afontova Culture*. An oviform tabular piece cut transversally from a tusk (4.2 × 2 × 0.4 cm) was found in

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* The Kokorevo Culture was identified in the late 1960s (Abramova, 1979b) and brackets the period between 15 and 11 thousand years ago The culture was evident in the Enisei River region in Central Siberia. The major diagnostic feature of Kokorevo is predominant tool fashioning on blades Major tool categories that illustrate this feature include end-scrapers, points, and burins. Blades were detached from large, single platform cores with single flaking surfaces. The grooved horn implements are mostly large and flat, and non-retouched microblades were used as in-laid parts for such composite tools. *In situ* occurrences of small hearths surrounded by stone pavements represent another characteristic feature of the Kokorevo Culture

* The Afontova Culture was identified in the late 1960s (Abramova, 1979a) and its period of existence brackets 16 – 12 thousand years ago. The culture was dispersed over the territory of Central Siberia in the Enisei River basin. Its major diagnostic feature is the predominant usage of flakes for tool manufacturing, which impacted the dominant tool forms (rounded microscrapers, lateral *racloirs*, chisel-like tools, borers, drills, single and double platform cores from which short blanks were detached, wedge-shaped microcores, and retouched microblades) The bone implements include such major categories as narrow, massive, grooved tools and adornments made of mammoth tusk.

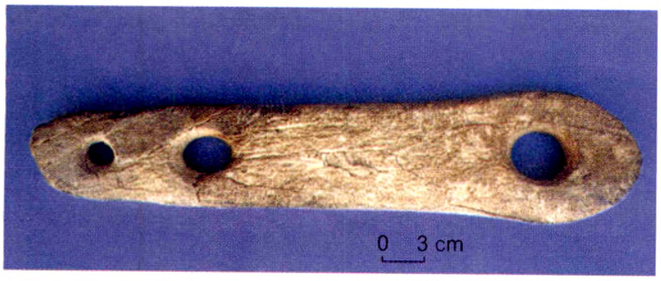

Fig. 6. Bâton de commandement from culture-bearing horizon 12Г at Listvenka.

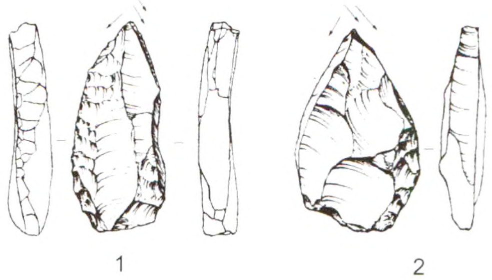

Fig. 7. Burins from culture-bearing horizon 12Г at Listvenka.

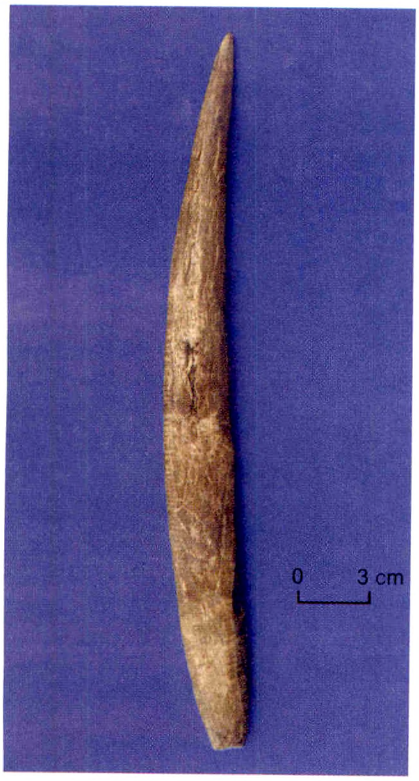

Fig. 8. Composite dagger from culture-bearing horizon 7A at Listvenka.

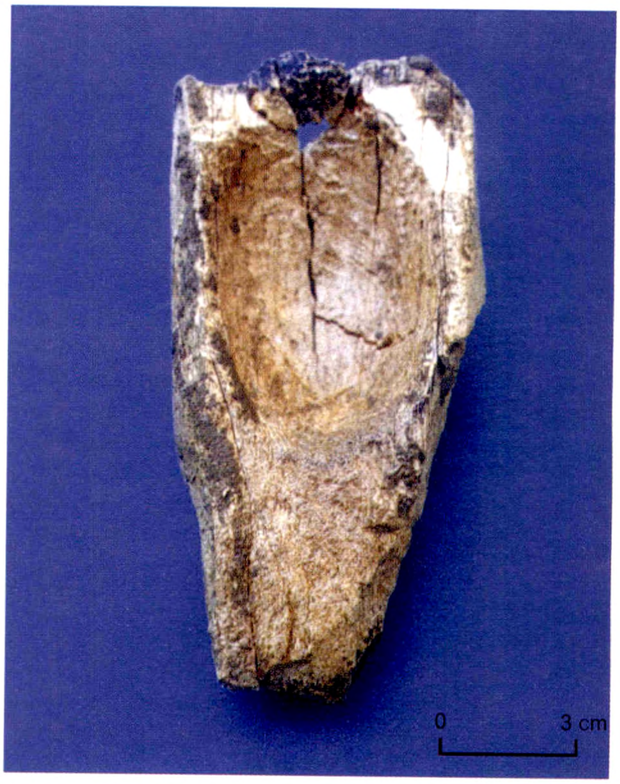

Fig. 9. "Bowl" from culture-bearing horizon 2 at Listvenka.

the immediate vicinity of the hearth. The surface of this transversally cut slice displays a texture that might have been perceived as a pattern. Both surfaces and the edges of this tabular piece were polished and show short parallel and crossed incision marks. One part of the edge was crumbled, probably as a result of the drilling.

Culture-bearing horizon 2 produced an implement shaped like a scoop ("bowl") with a short massive handle (15.7 × 7.5 × 4 cm) (Fig. 9). The "bowl" has a regular ovoid form with a concave bottom and thick and smooth walls. The shape and the size of this object are reminiscent of "lamps" recorded from many European Upper Paleolithic sites. The "bowl" demonstrates definite signs of secondary use. The entire surface of the object, originally polished, shows signs of mechanical erosion. However, the bottom of the "bowl" has a largely fresh surface bearing traces of recent working with the help of a cutting tool with a long working edge. The purpose of this additional working (to deepen the "bowl", to refresh the surface, or to remove some features preventing from comprehension of this tool as a receptacle) can hardly be determined.

Culture-bearing horizons 2 and 4 did not produce any burin-like tools.

Conclusion

The present analysis of the Listvenka archaeological materials has shown that during the Early Stone Age, the significance of mammoth tusk as a raw material changed. Certain carelessness in manufacturing tools, considerable quantities of waste and defective pieces as well as the typological and morphological diversity of the tusk tool kit, have been noted only in the horizon 19 collection. This horizon corresponds to the threshold between the Gydansky stadial and interstadial*. Rather primitive points were made of mammoth tusk as well as objects that might have had an aesthetic, magic, and intellectual significance for early humans. Later on, the situation changed and the tool manufacturing role of the tusk as a raw material was replaced by ritual and household roles. Only original, uncommon objects were made of mammoth tusk, and very often no analogues have been reported of recovered objects from contiguous areas**. Such a general way of reasoning would seem agreeable if not for the cultural differences in the industries recovered from different layers. Mammoth hunting does not necessarily guarantee that mammoth tusk working technologies will flourish. People inhabiting Afontova Gora used it rather often, though in a somewhat monotonous way. Sites of the Kokorevo Culture (with the only exception of Listvenka) have not produced any notable mammoth tusk implements even at the early stages of this culture development. It may be hypothesized that a wide usage of mammoth tusk may be regarded as an indicator of a specific technical tradition dispersed over the territory of South Siberia, at least up to the western Baikal area. The term "small blade-based industries" suggested by N.F. Lisitsyn (1996, 1997) and S.A. Vasiliev (1996) does not seem appropriate. The term of the "Malta-Buret" affinities, which has already been used by certain researchers, seems more appropriate.

Let us now turn back to the hypothesis of a western origin of this tradition. Siberia represents the easternmost territory of its distribution. Siberian sites with small blade industries date in the range of 22 – 20 to 16 ka ago. Relevant sites from West and Central Europe date to 30 – 20 ka ago, and to more than 20 ka ago in East Europe. Apparently, Siberia was inhabited by people bearing other cultural traditions, e.g., the tradition of core flaking from its narrow face and producing large, locally specific blades, by the time of the arrival of new population. Such locally specific features stipulate regional specification in the inserted tradition of working stone, bone, and tusk, resulting in the formation of small blade industries of the Altai, Enisei, and Lake Baikal areas. For instance, the only site from the middle Enisei area that has yielded mammoth tusk objects including beads, a bracelet fragment, and treated tusk fragments is Kashtanka I During the middle and late Sartan, this culture might have developed in different ways. It might have dissolved into the local cultures or mixed with other cultural traditions. The Ust-Kova site (middle and late technocomplexes, for which a rather early age estimations have been currently made) from the northern Angara River region seems to be a distant descendant of Malta. Ust-Kova is a variant of the blade-based lithic industry without *pièce esquillée* technology and classical burins, but including bifaces-knives, a feature that is not characteristic of small blade industries. The developed technology of tusk working is illustrated by pieces of art, by numerous and various adornment pieces (beads and a bracelet), by tabular pieces with engraved marks, and by objects of unclear purpose (discs with one convex surface) (Vasilievsky, Burilov, Drozdov, 1988). Only the Afontova Culture from the middle Enisei yielded mammoth tusk implements dating from the Middle and Late Sartan. The Afontova implements are not so sophisticated as those recovered from Malta. Certain similarities have been noted in the archaeological materials recovered from such sites as Abrashikha and Blizhniy Log (the Balakhtinski Region of the Krasnoyarsk Province), but investigations of these sites have not yet been completed. The collections assembled from these two sites do not include wedge-shaped cores, but comprise carinated *racloirs* and retouched microblades (Blizhniy Log) (Akimova, Stasiuk, Tomilova, 1998).

The collection recovered from culture bearing horizon 19 at Listvenka has not shown subsequent development in the younger collections. Evidence of tusk splitting, cutting, and polishing has been obtained only from culture-bearing horizons 19 and 12Г. Collections of complete implements associated with these layers are not so numerous, unlike abundant assemblages of by-products and waste. It is noteworthy that culture-bearing horizon 12Г also produced composite tools bearing the characteristic pattern of straight and wavy lines on the surface (Akimova, Vdovin, Makarov, 1996). Despite the noted partial heterogeneity, the collection recovered from horizon 12Г shows a combination of specific features of tusk implements typical for "traditional" Enisei cultures. The noted combination can hardly be explained by local-cultural or stadial development. Thus, we believe the tradition of tusk working in the Siberian Paleolithic may provide additional information for the resolution of the issues of continuity and interrelationships among archaeological cultures.

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* The threshold of the Gydansky stadial and interstadial has been estimated as 16 ka ago (Kind, 1974), during the first half of the Sartan cold oscillation period (W_3) dated to 22 – 10 3 ka ago

** However, it should be noted that the rocky landscape and narrow river valleys in the area of the Listvenka site might not have been conducive for mammoth pasturing. Thus, scarcity of mammoth tusk might have resulted not only from a general decrease of mammoth population by the end of the Sartan oscillation, but also by the decline in local mammoth habitats

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DISCUSSION

THE ISSUE OF THE MIDDLE TO UPPER PALEOLITHIC TRANSITION

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THE LITHIC INDUSTRIES OF THE MIDDLE AND UPPER PALEOLITHIC OF THE LEVANT: CONTINUITY OR BREAK?

Introduction

In recent studies of major prehistoric changes, the "transition" from the Middle to the Upper Paleolithic in the Levant has become an important subject. This is due to the unique geographic position of this region at the crossroads of Africa and Eurasia. The appearance in Kebara Cave of a well-dated blade industry, known as the Ahmarian (ca 43 – 42 ka BP), marks the advent of characteristic blade industries common to the Upper Paleolithic (e.g., (Bar-Yosef et al., 1996)).

Prior to this manifestation, lithic assemblages traditionally called "Transitional Industries" in the Near East were considered to be Initial Upper Paleolithic (Marks, 1990; Kuhn et al., 1999). These assemblages were recorded in Ksar 'Akil rockshelter in Lebanon (Bergman, 1987; Ohnuma, 1988; Bergman, Ohnuma, 1987; Ohnuma, Bergman, 1990; Azoury, 1986), and in the Negev at the site of Boker Tachtit (Marks, 1983; Marks, Volkman, 1983). In Boker Tachtit level 1 assemblages, blank production is almost identical to Upper Paleolithic core reduction – namely, the systematic removal of blades and points, the repeated use of crested blades, and the exploitation of nodules from the shorter narrow front of the raw material block (narrow-sided cores) (for details, see (Meignen, 1996: 111 – 115)). This volumetric concept was largely adopted during the Upper Paleolithic and therefore we classify Boker Tachtit level 1 as an Initial Upper Paleolithic assemblage (*contra* (Marks, Volkman, 1983)). In addition, the very rare retouched pieces reflect an inventory that has long been considered to mark the Upper Paleolithic.

In order to identify the processes that allowed the development of the technology of the Upper Paleolithic, either from a local entity or as a result of cultural diffusion, it is necessary to have a profound knowledge of the technical traditions of the Middle Paleolithic, and in particular, of its latest phase when various factors may have been behind the observable changes.

The Levantine Middle Paleolithic

During the last twenty years, numerous excavations in the Near East have enriched our knowledge of the Middle Paleolithic industries and chronology (e.g., (Bar-Yosef, 1998) and references therein) especially due to the systematic dating of artifacts. Contrary to previous opinion, it appears that the Middle Paleolithic period began in the Near East at the close of OIS 8 or early OIS 7 (Mercier et al., 1995)* and lasted well into OIS 3, hence spanning more than 200,000 years.

To schematically summarize the main characteristics of the Middle Paleolithic assemblages during this long period, we offer the following comments.

1. The earliest Middle Paleolithic industries (also referred to as "Tabun D-type") are known from several other sites such as Rosh Ein Mor (Marks, Monigal, 1995), Hayonim Cave (lower E and F), and Abu Sif (Meignen, 1998). Each of these assemblages shows a diversity of production systems or core reduction strategies used to produce variable blank-morphologies. A similar observation concerning the Acheulean complex in the Levant has previously been stressed by Goren-Inbar and

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* See also. Marks A. and Schwarcz H., "Dating the Middle Paleolithic of the Central Negev An Ongoing Effort", Paper presented at the 64th Annual Meeting of the Society for American Archaeology, Baltimore, 1999.

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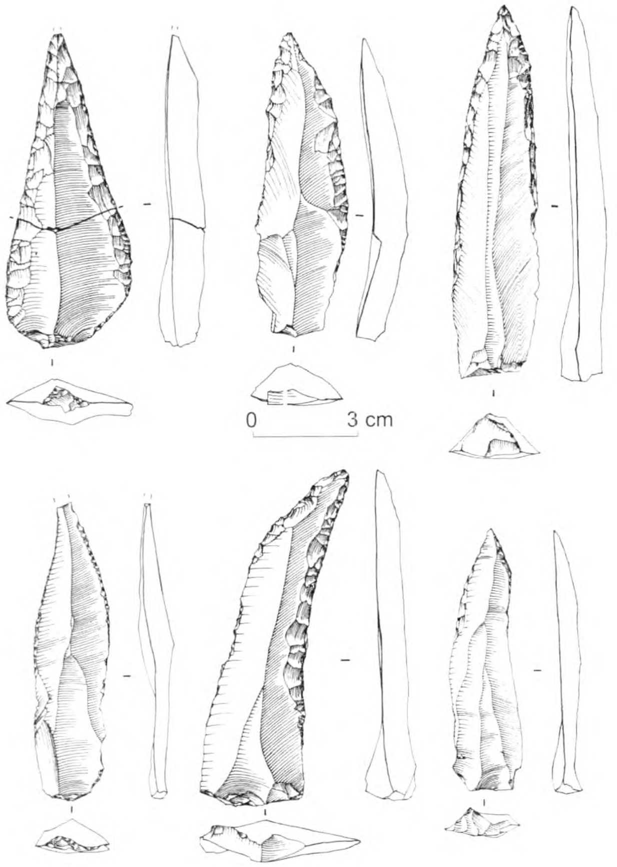

Fig. 1. Elongated retouched points. Hayonim Cave (lower E and F).

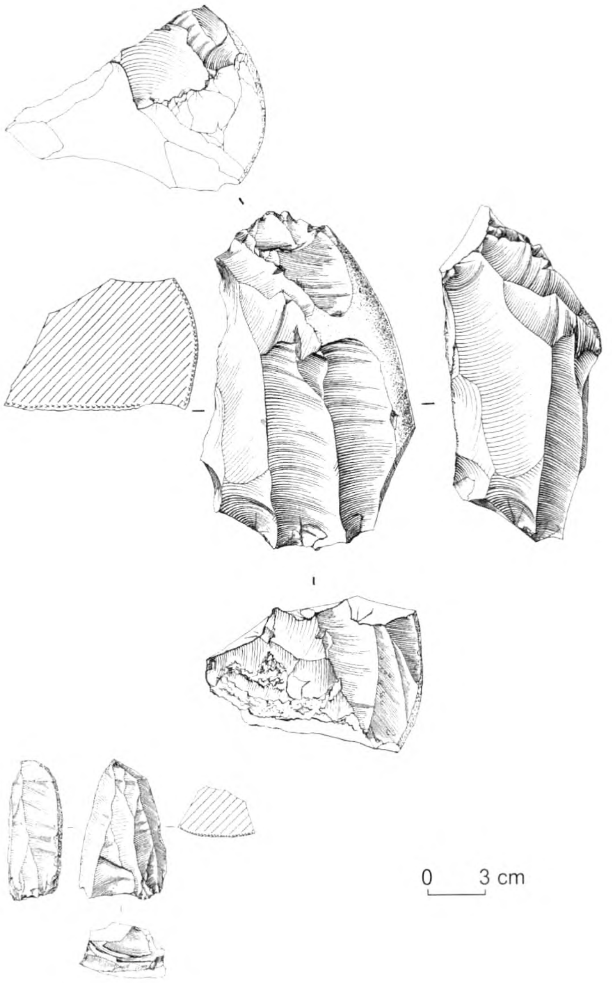

Fig. 2. Semi-prismatic cores. Hayonim Cave (lower E and F).

Belfer-Cohen (1998: 206) who suggest that "each morphotype reflects a particular mental template outlining a specific core reduction strategy". The recently analyzed assemblages of the early Middle Paleolithic likewise reflect a combination of technical approaches to the original nodules. In the older layers at Hayonim Cave, dated to 215 – 180 ka ago, as well as at Rosh Ein Mor dated to 210 ka ago (Marks, Monigal, 1995) *, the elongated blanks (blades and points) (Fig. 1) originate from a particular laminar core reduction strategy (Fig. 2) similar to that of the Upper Paleolithic (Meignen, 1998, 2000) and which apparently co-existed with the production of shorter blanks obtained by Levallois methods. On the contrary, by late Middle Paleolithic, the Levallois debitage system had developed into the exclusive core reduction strategy at most Levantine sites. Levallois methods were present in some Acheulian assemblages, but they became the rule and were expressed in all their variability in the Levant beginning around 150 ka years ago.

2. As a general observation we note that the Middle Paleolithic of the Levant is characterized by the production of blanks that are relatively elongated. These blanks are defined as blades when the length/width ratio is > 2, or as elongated flakes when the length/width ratio is >1.7 – 1.9. In reality, during the Middle Paleolithic we observe the repeated phenomena of true blade production (Meignen, 1994, 2000; Monigal, 2001) by various Levallois and laminar methods (Boëda, 1990). First, as mentioned above, blade production is common between 200 – 150 ka (e.g., Tabun unit IX, Douara IV, Rosh Ein Mor, Hayonim Cave (lower E and F), and Abou Sif). Although the blade production results from core reduction strategies used later in the Upper Paleolithic, the blanks still bear attributes characteristic of the Middle Paleolithic. For example, the blades are relatively thick, with slightly irregular edges and ridges as the result of the hard hammer technique. In addition, they are often associated with the production of shorter pieces, usually flakes and points. The early Middle Paleolithic assemblages demonstrate a proliferation of

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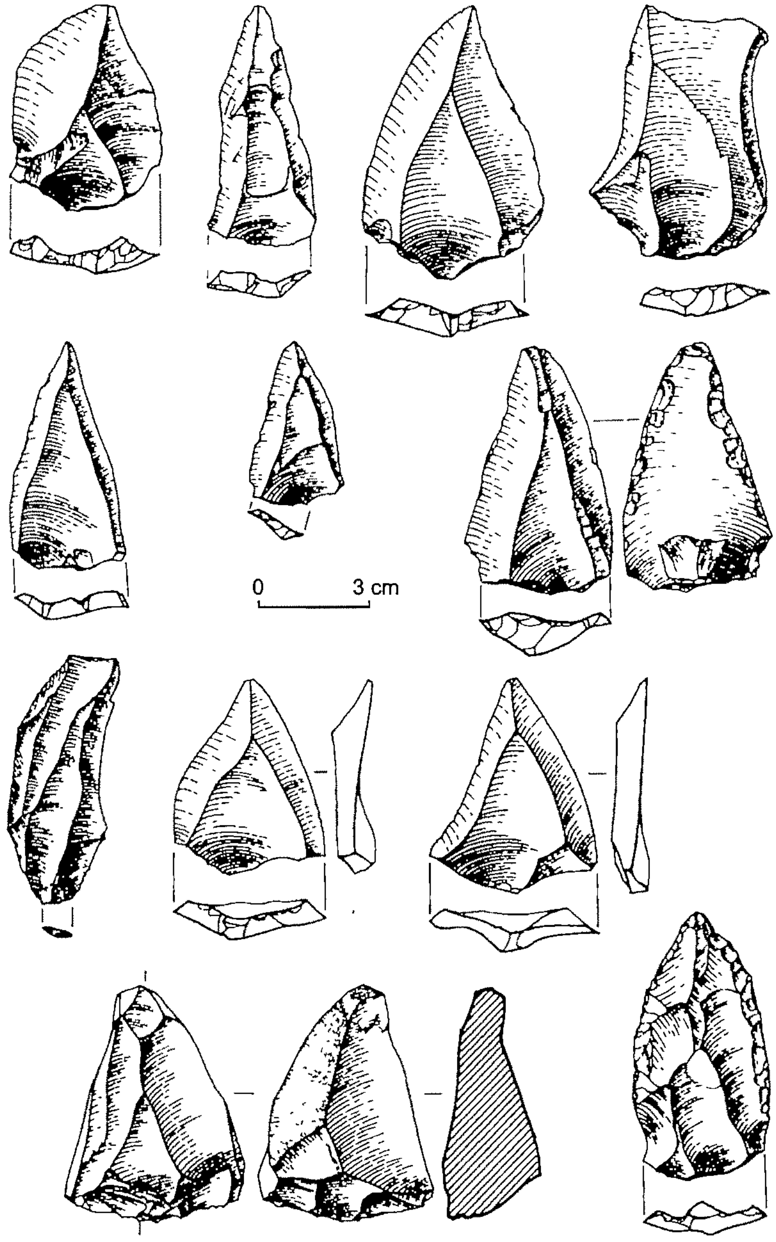

Fig. 3. Levallois end-products, side-scrapers, and a core. Kebara Cave

Middle Paleolithic tools, often retouched points such as at Hummal, Hayonim (Fig. 1) and Abu Sif, although Upper Paleolithic tool types such as burins are sometimes quite common (e.g., Rosh Ein Mor). The production of the laminar blanks diminishes after OIS 5. At certain sites like Quneitra (Goren-Inbar, 1990), blade blanks exist but the majority of the products are Levallois flakes. It seems that laminar production was re-invented ca 47 – 46 ka in what is now called the Initial Upper Paleolithic.

3. The late Mousterian (also known as "Tabun B-type") such as in Tabun B, Amud, and Kebara Cave (see below) is characterized by Levallois products that are short but relatively narrow and elongated as noticed by L. Copeland (1975: 332). Copeland defined this assemblage as "...cores producing flakes and points... but *laminar* and *narrow* forms prevail..." This type of industry is quite different from the Mousterian industries across Europe.

4. The Levantine Middle Paleolithic is generally characterized by cores exploited in a uni-directional mode and less frequently in a bi-directional mode – a feature elucidated by H. Crew (1975). An emphasis on unidirectional convergent reduction (Meignen, 1995) often results in blanks that are distally convergent. Similar observations were made by D. Garrod who had

noticed a trend in the production of subtriangular blanks in Tabun layers B and D (Garrod, Bate, 1937), but with far fewer examples in Tabun C. Surprisingly, this type of blank is quite rare during the Middle Paleolithic in many other regions such as West Europe and North Africa.

Hence, the prevalence of these elongated forms in the Levant tempts one to test the proposition that the origin of the Initial Upper Paleolithic was in this region We need to examine the late Mousterian and its variability in further detail beginning with Kebara Cave where a large sample was recorded and analysed (Meignen, Bar-Yosef, 1991; Meignen, 1995, 1998). As a reminder, most biological anthropologists consider the human fossils associated with the Late Middle Paleolithic assemblages to be Neanderthals (Kebara, Amud, Dederiyeh, Tabun) (Vandermeersch, 1997; Trinkaus et al., 1998), although an alternative view has been expressed (Arensburg, Belfer-Cohen, 1998).

The Late Mousterian in Kebara Cave and the internal variability during the late Middle Paleolithic

The Mousterian assemblages at Kebara Cave, dated by TL and ESR to ca 64 – 48 ka BP (Bar-Yosef et al., 1992) are dominated by the production of flakes by the Levallois recurrent method (Fig. 3) with length/width ratios of 1.70 – 1.80 and often with subtriangular shapes. The removals are generally unidirectional convergent (i.e., cores with convex detachment surfaces and oblique lateral removals), and not like flat classical Levallois cores (Meignen, 1995: 372). The exploitation schemes are mostly similar across the stratigraphic units with some internal variability resulting in slight differences in the lithic assemblage composition. In the lower units (XI – XII) blades represent 30% of the Levallois blanks. In units IX – X the broad based Levallois points are more frequent, and the tendency toward subtriangular shapes persists into the upper units together with subquadrangular morphologies and centripetal debitage (units VIII – VI). Retouched pieces are generally rare (3 – 4%) through the entire sequence.

There are several cases demonstrating the variability that results from the various methods and is inherent to the late Middle Paleolithic Levallois technical system (Boëda, 1994, Meignen, 1998). In a few assemblages such as Quneitra (Goren-Inbar, 1990) and layer XXVI in Ksar 'Akil (Marks,Volkman, 1986), the centripetal debitage prevails. Among examples of unidirectional convergent debitage, there are assemblages with elongated blanks such as Amud Cave (layer B1) (Hovers, 1998), which dates by TL and ESR to ca 53 – 58 ka BP. Most of the subtriangular products are known as "leaf shaped flakes" (Watanabe, 1968) due to a specific removal pattern on the core (Meignen, 1995; Hovers, 1998). Tor Faraj and Tor Sabiha in Jordan (Henry, 1995, 1998) show both short and elongated point production resulting from different core reduction strategies. In particular the assemblage of Tor Sabiha is characterized by a high laminar index (I_{lam}=37.1), which resembles the early Mousterian industries. These examples demonstrate the degree of flexibility that one finds among the late Mousterian industries and which could be "the prerequisite for accepting a new technological mode... the relaxed technological norms would have complemented the spread of innovations" (Hovers, 1998: 158). However, the dominant production of subtriangular, relatively elongated, flakes distinguishes this phase in the Levant.

Indeed, during the late Levantine Middle Paleolithic the full array of end-products of different morphologies – flakes, blades and points – is present and was mostly obtained through one basic technical concept of debitage. The variability among the panoply of artifacts noticed at sites of the same age in the Levant (e.g., Amud and Tor Faraj, Tor Sabiha) results from one technical approach to lithic production. This situation stands in striking contrast to the diversity of debitage systems (Levallois but also Quina and discoid) at contemporary sites in West Europe and particularly in France.

The Initial Upper Paleolithic

In Kebara Cave we did not find the so-called "Transitional Industry" (also known as the Emiran). Subsequent to the stratigraphic gap, units IV – III contain Upper Paleolithic assemblages dated to ca 43 – 42 ka BP (Bar-Yosef et al., 1996). The lithics are mainly blades obtained from prismatic cores, often with two striking platforms, and produced with a soft hammer. Bladelets are rare. The retouched pieces are mainly blades including pointed specimens. Units II – I are classified, on the basis of their tool types, as Levantine Aurignacian with carinated and nosed scrapers and one split base bone point. Hence the earliest Upper Paleolithic units (IV – III) at Kebara, as at the sites of Ksar 'Akil and Boker Tachtit, do not contain Aurignacian industries as in West Europe. This is an important distinction. The lack of any evidence for continuity in Kebara Cave is foremost due the absence of human occupation. Therefore the testing of the two hypotheses, whether the shift in lithic technology emerged locally or elsewhere in the region, or resulted from diffusion (cultural contact or even migration), needs to be addressed through the examination of other assemblages.

Apparent stratigraphic continuity was noted in Ksar 'Akil rockshelter. Although the site was excavated using archaic methods, it contains both late Middle Paleolithic and very early Upper Paleolithic deposits and thus its

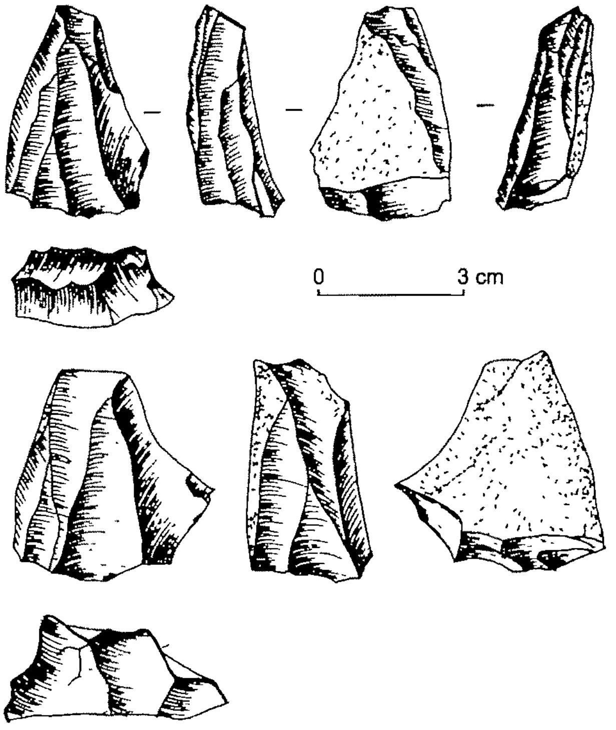

Fig 4. Unidirectional "flat" cores with wide-surface and lateral exploitation.Ksar 'Akil rockshelter (layer XXIV).

assemblages are currently the most promising for further study. The researchers who studied the collections and examined the excavation documents stated, for example, that "the overall degree of mixing is relatively insignificant" (Ohnuma, Bergman, 1990: 94). In addition, few of the layers are thicker than 50 cm (Marks, Volkman, 1986: 7). The largest obstacle is the selection of items that were kept for future study – as exemplified by the collection at the Peabody Museum (Harvard University) – which does not allow for full recording of the technological attributes for quantitative studies. Because of the selectivity of the samples, we are only able to observe the general characteristics of the methods employed in detaching the blanks.

Another obstacle is the lack of radiometric chronology for the lowermost layers at the site. The upper portion was dated through a series of charcoal samples (Mellars, Tixier, 1989). The earliest dates for the Levantine Aurignacian were established as 31,200 ± 1500 BP (OaX-1804), 32,400 ± 1100 BP (OaX-1805), and 32,000 ± 1500 BP (MC-1192). On the basis of the estimated rate of deposition, Mellars and Tixier suggested that the earliest assemblages would fall between ca 43 and 50 – 52 ka BP (see also (Bar-Yosef, 2000)).

Examination of the Ksar 'Akil collection by a number of scholars as well as by one of the authors (Meignen) allows us to describe the main attributes of the early assemblages as follows.

Layers XXVIII to XXVI contain the Middle Paleolithic assemblages. At the base, the material from layers XXVIII A and B is characterized by the production of more or less elongated triangular blanks, often "leaf shaped flakes", removed from unidirectional convergent, Levallois or semi-prismatic cores. In these two layers the Upper Paleolithic tools (burins and end-scrapers) are dominant (Marks, Volkman, 1986), but are considered of mediocre quality. Layers XXVI A and B contain assemblages dominated by oval and subtriangular flakes, produced from Levallois cores with either centripetal or unidirectional removal patterns. Thus, the assemblages show the variability of technical Levallois methods previously stressed for the late Middle Paleolithic. The common retouched pieces are mainly typical Mousterian side-scrapers.

Layers XXV through XXI are considered the "Transitional Industry". The collection reflects the persistence of the Levallois method, mainly of unidirectional convergent scheme, associated with a developing volumetric concept of core exploitation. We identified the latter on relatively flat unidirectional cores with specific technical traits. They have been reduced not only along the widest surface (by unidirectional convergent removals), but also from the narrow sides (Fig. 4). A change in the orientation of the platform preparation, establishing a new angle between this striking platform and the flaking surface (Boëda, 1995), allowed reduction into the thickness of the block. These specific core morphologies were identified in other "transitional" industries such as Koulichivka (Meignen et al., in press).

In addition, prismatic cores with one or two striking platforms are present (Fig. 5) in Layer XXIV, at the base of the Upper Paleolithic sequence. This type of operational sequence ends with the production of very elongated pieces, frequently with convergent edges (Fig. 6). However, the shapes of these blades and points are still not very regular. They bear faceted striking platforms and were removed using hard hammer percussion. Bergman and Ohnuma note in their consecutive studies the onset of the soft hammer technique expressed by linear and punctiform striking platforms as well as the overhang removal by abrasion (Ohnuma, Bergman, 1990).

The retouched tools are Upper Paleolithic types including end-scrapers, chamfered pieces, and burins by lateral preparation (see (Ohnuma, Bergman, 1990: fig 5 – 9)).

Layers XX – XVI contain assemblages characteristic of the Upper Paleolithic with standardized regular blades and bladelets, often with parallel edges (Fig. 7). Cores generally display opposing striking platforms. "Soft hammers were used to strike close to the platform edge (marginal flaking) resulting in longer and thinner

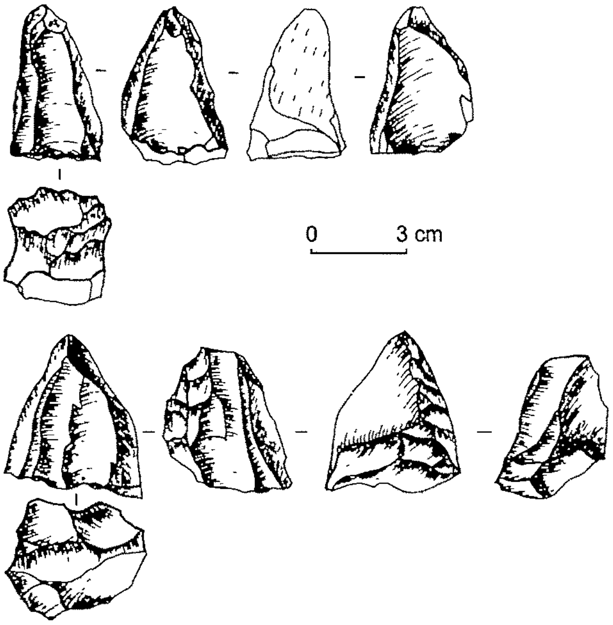

Fig. 5. Prismatic and semi-prismatic cores. Ksar 'Akil rockshelter (layer XXIV)

debitage. Overhang removal by abrasion in order to prepare the edge of the core for marginal flaking is well developed " (Ohnuma, Bergman, 1990: 104).

According to Ohnuma and Bergman (Ibid.: 114), "the technology has changed gradually from hard percussion to soft percussion; from non-marginal flaking to marginal flaking". Common tool types are end-scrapers, backed pieces and Ksar "Akil points.

In sum, at Ksar 'Akil, the " transitional assemblages " contain subtriangular blades and elongated points with morphologies reminiscent of Levallois products, but these were obtained from a different system of debitage as identified by the semi-prismatic, prismatic, unidirectional convergent, or more rarely bidirectional cores.

The latter core reduction strategies are nevertheless relatively similar to those described from layers XXVIII A and B, and thus close to the late Middle Paleolithic. In both of assemblage categories, hard hammer reduction was employed; the only change was the organization of the removals that formed the striking platform (see Fig. 4). The new angle between the striking platform and the surface of the debitage (also known as the exterior angle) facilitated removals not only on the wider surface, like in the Levallois technique, but also from the narrow sides of the core. This technical change allowed a longer exploitation of the cores, often giving them a semi-prismatic shape

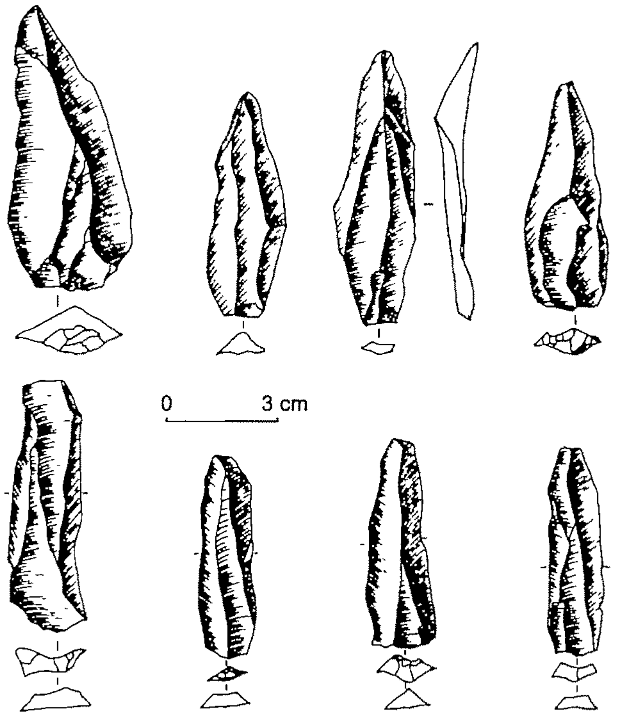

Fig. 6. Laminar products. Ksar 'Akil rockshelter (layer XXIV).

Conclusion

The late Middle and Initial Upper Paleolithic operational sequences as seen in Ksar 'Akil demonstrate what one may define as a subtle change in concept This change in the volumetric concept had occurred once before ca 250 – 180 ka in the Levant. The use of soft hammer was practiced in shaping Acheulian bifaces. The same technique is evident in Upper Paleolithic debitage strategies and produces the same reults – thin removals. Hence one can suggest that the technical shift from the Middle to the Upper Paleolithic is not revolutionary but rather a rearrangement of previously practiced technical elements

The lithic assemblages from the early Upper Paleolithic are characterized by the production of blades and bladelets. The adoption of marginal percussion and soft hammer technique and more careful controlling of the orientation of the striking platform, the longitudinal curvature, and the transversal convexity of the cores, led to thin blanks (blades and points) with regular forms. These achievements are apparent in the assemblages of

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* Fox J. Tor Sadaf rockshelter: The Middle to Upper Paleolithic Transition and the Early Ahmarian in the Wadi al-Hasa, West-Central Jordan M.A Dissertation Iowa State University, 2000 (unpublished).

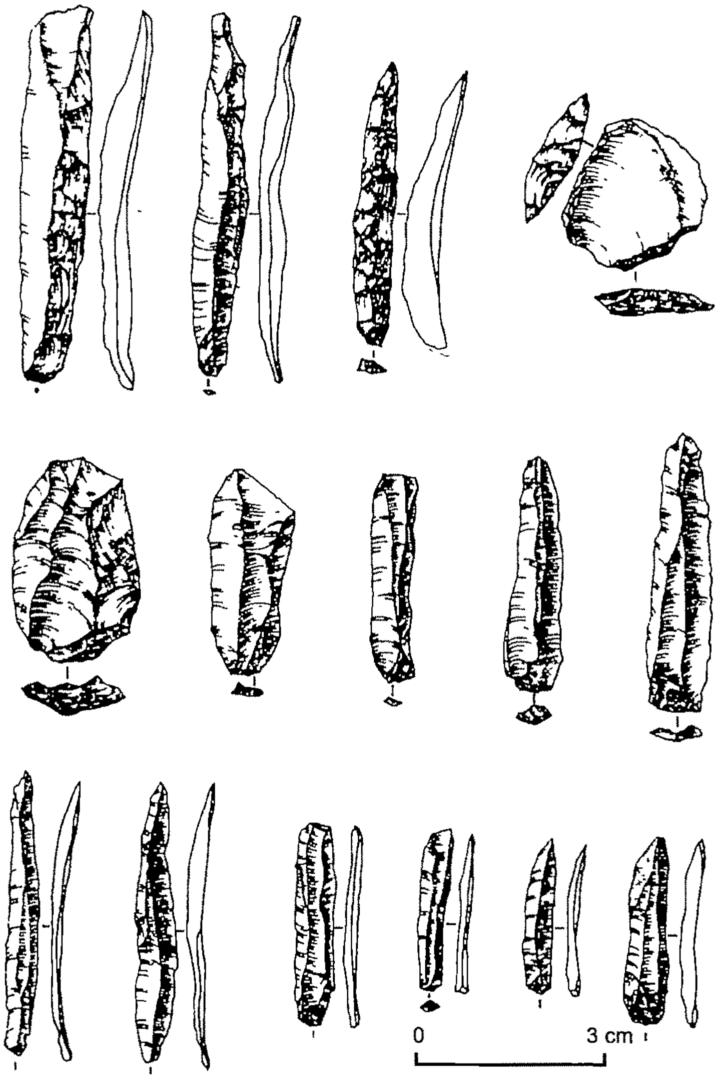

Fig. 7 Debitage products. Ksar 'Akil rockshelter (layers XVII – XVI) (after (Ohnuma, Bergman, 1990)).

the early Ahmarian of Boker A (Marks, 1983), Tor Sadaf, Uçagizli (layers A – D) (Kuhn et al., 1999), Ksar 'Akil (layers XX – XVI), and Kebara (units IV – III). At Ksar 'Akil and Uçagizli, the techniques employed were comparable, especially the gradual appearance of the soft hammer (Kuhn et al., 1999).

However, the gradual shift in technology does not imply a duplicate process in the domain of retouched pieces. Here we note, like others before us, a major change, already in the Initial Upper Paleolithic, with the disappearance of Mousterian tool types and a clear dominance of the tool types considered characteristic of the Upper Paleolithic in most of Eurasia and Africa. This change, which according to the current radiocarbon chronology took a few millennia, is viewed as revolutionary by certain authors (e.g., (Bar-Yosef, 1998, 2000; Tostevin, 2000)).

At the same time we may conclude that the technical knowledge acquired during the late Middle Paleolithic served as the background for the emergence of the Upper Paleolithic blade production. This may mean that the cultural change actually occurred in the Levant as indicated by the Ksar 'Akil sequence. Although cultural diffusion or contact with foreign population may have triggered the change, the technical elements of the Upper Paleolithic industry were already in place in this region. If the diffusion hypothesis is correct, we need to find a late Middle Paleolithic industry in a neighboring region that dates to ca 60 – 50 ka, where the prevalence of elongated products already existed. If the recently published date of ca 55 ka (Vermeersch et al., 1998) can be confirmed, a good candidate could be the late Middle Paleolithic assemblage from Taramsa 1 in the Nile

Valley. This material contains bidirectional debitage that Van-Peer (1998) considers to be "Transitional Levallois ". In the Negev, the assemblage of Boker Tachtit level 1, dating to ca 46 – 47 ka, is dominantly bidirectional and is thus a good candidate for the beginning of the Levantine Upper Paleolithic as derived from an Egyptian Middle Paleolithic cultural substrate. Unfortunately the evidence from Africa is still insufficient for validating this hypothesis.

It is a probable scenario that the emergence of the Upper Paleolithic as seen in the domain of lithic technology in the Levant with standardized blades and bladelets and the typical retouched pieces (tools) is not a unique process. A certain number of elements had already been invented and appeared sporadically beforehand during the Middle Paleolithic, such as the systematic detachment of blades and the presence of end-scrapers and burins. Hence, there existed among Middle Paleolithic humans the knowledge (and probably the necessity) of producing laminar products as well as the different tool forms.

The logical conclusion is that the change marking the beginning of the Upper Paleolithic was not a radical one, but was perhaps the novel arrangement and intensified exploitation of previous innovations in lithic technology, as suggested by Kozlowski (1996: 206).

It is not impossible that exterior influences such as contact with an incoming population, or a diffusion of ideas and fashions in tool making through cultural interaction, stimulated the formation of a new tool-kit in certain regions. These processes of technological change employed pre-existing knowledge and facilitated what is defined as a local development.

Given these results it becomes obvious why lithic studies cannot furnish the significant evidence necessary to justify calling the Initial Upper Paleolithic a cultural revolution This period marking a major change, sometimes called the "creative explosion", is based on other cultural attributes such as the use of shells for body decoration, the wide use of bones, teeth and antlers for making tools and pendants, and the creation of durable symbolic expressions such as burials and parietal art.

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COMPARATIVE AND STYLISTIC ANALYSES OF A BISON FIGURINE FROM THE ZARAISK SITE

Introduction

As a result of extensive studies in the 1990s, the Upper Paleolithic site of Zaraisk became widely known to archeologists. This unique site is located on the right bank of the Osetr River (the right tributary of the Oka River) in a historical part of the modern city of Zaraisk, the Moscow Province. It was discovered by L.I. Maksimova, a chief conservator of the Zaraisk City Museum, who collected lithic artifacts from a destroyed zone of the cultural layer near the northern wall of the Zaraisk Kremlin. In 1980, after A.V. Trusov saw these materials, he excavated preliminarily a small area and established the presence of cultural deposits. Further excavations were conducted in 1982 – 1983 and 1989 by Trusov (1994) with assistance by L.V. Grekhova.

An archaeological exploration of the site continued in 1994 because the site layers were seriously disturbed by installation of gas service in the territory of the Kremlin. A small expedition of the Department of Paleolithic Archaeology of the Institute of Archaeology, Russian Academy of Sciences started excavations on 5 × 5 m excavation area 4.

Since 1995, the Zaraisk site has been extensively studied by the archaeological expedition headed by Kh.A. Amirkhanov (2000). By present, 265 sq. m of the site area have been excavated, and 100 sq. m of this area are within the main excavation area 4. However, excavations have covered only a small part of the total site area.

Integrated data on various types of stratigraphy (archaeological, lithological, paleocryological, and palynological) suggest the existence of at least four asynchronous occupation horizons. From a series of radiocarbon dates correlated with the stratigraphic data (22 dates), the first and the most ancient horizon was found to be 23,000 – 22,000 years BP, while the latest was about 17,000 years BP. The bison figurine described in this paper was found in a storage pit typical of the sites of the Kostenki Culture, which is associated with the first occupation horizon.

Lithic artifacts, character of features in the cultural layer (hearths, pits, etc.), and specific elements of dwellings and household buildings (located in the excavated area) suggest close affinity between the Zaraisk site and sites of the Kostenki Culture. Bone artifacts, decorations (a necklace and separate arctic fox and wolf teeth with holes near the roots), and ornamental patterns (net-like engraving and "oblique cross") also contribute to the noted similarity. Until recently, the art of ancient inhabitants of the Zaraisk site was completely unknown, although abundant artistic masterpieces were found at the sites of Kostenki-1 (layer 1) and Avdeevo, which belong to the same culture as Zaraisk.

The first piece of art at the Zaraisk site was found during the 2001 field season. This is a bison figurine carved of mammoth tusk. In comparison with the well-known examples of the Paleolithic art from East and Central Europe, this figurine depicting a bison in elaborated detail is artistically expressive and stylistically unique. Its size and the circumstances of deposit distinguish it from other finds of the Kostenki Culture. All the above facts contribute to the problems that extend far beyond the framework of the Kostenki Culture and are related to the fields of the history of fine arts, archaeology, cultural studies, and paleoethnology. Of special interest are reliable data suggesting intentional damage to the figurine, its partial painting in red ochre, and the subsequent ritual burying of it.

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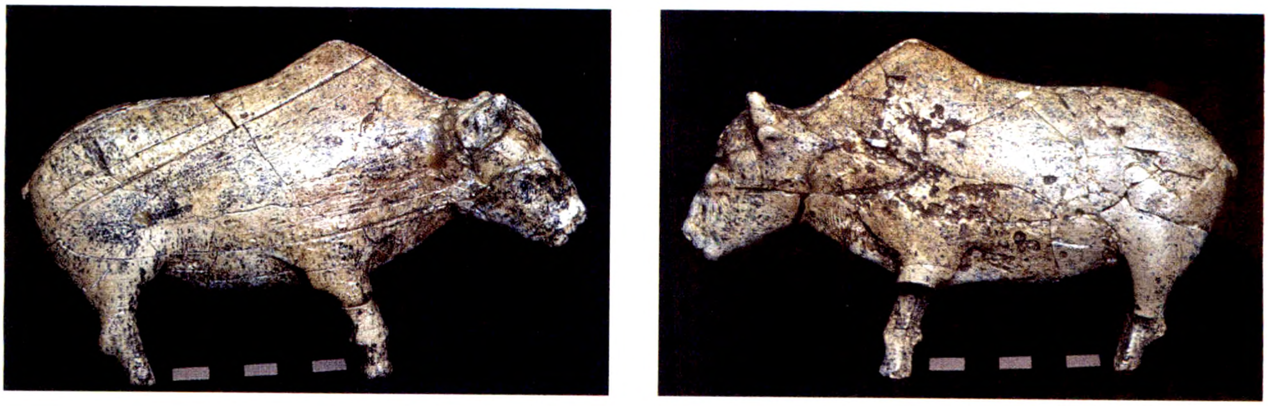
a
b

Fig. 1. Bison figurine from the Zaraisk site.
a – left side, *b* – right side.

Because of a limited paper size, we consider only two aspects related to this figurine: comparative (in the context of European Paleolithic art) and stylistic analyses. However, artistic and esthetic characteristics, technological details, taphonomy, and the purpose of this artifact are beyond the scope of this paper.

Common characteristics of the bison figurine

Being a piece of mobiliary art, the Zaraisk figurine embodies the idea and essence of an actual sculpture. It is sculptured in the round in order to view it from all sides (Fig. 1). The figurine has the following dimensions: length 16.4 cm, height 10.4 cm, and maximum thickness (in the middle) 3 cm. The ratio of the height (in croup) to the body length is 1.6:1, which is a perfect ratio for an adult bison. The forepart of the body looks more massive than the hind part.

Its massive and short head is low attached. The short and thick horns are turned to opposite sides. The ends of the horns are not bent, which is typical of young animals. The mane is depicted as a low cylinder engraved with frequent transversal notches crossed with short oblique lines forming an "oblique cross" pattern. The mane begins from the occipital part and finishes lower than the hump peak. In the upper part of the mane, the cross ornament is denser because it consists of two oblique crossed notches. This pattern is typical of art of the Kostenki Culture. At the Zaraisk site, it was found on a mallet hilt made of ivory with an ornament on its thicker part.

A pronounced fatty hump is shown as a continuation of the nape, elevated over the back. The highest point is on the central part of the hump. Because of a limited space for the hump (less than one third of the whole back), the croup does not look cut toward the hind part of the body. Behind the hump, the back of the bison slightly sags. The tail is shown as a small (0.5 cm) round prominence turned downward.

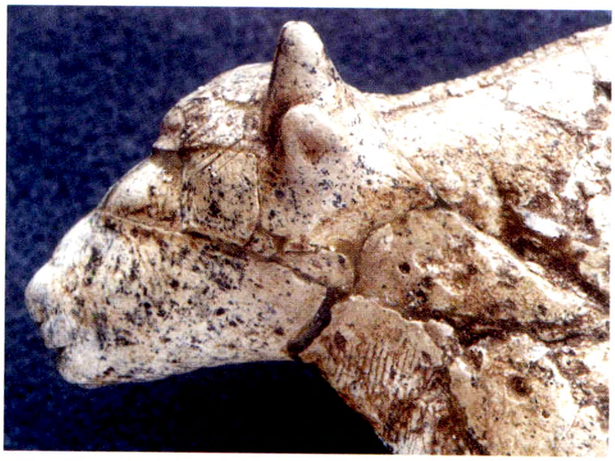
Fig. 2. Bison figurine from the Zaraisk site (fragment).

The fur is not depicted except for the forelock and beard in the lower part of the neck. The hair is shown by engraved thin lines running parallel to one another (Fig. 2).

This bison is unique in that its four legs are all shown separately, not joined together like "pedestal-shaped" legs. The figurine can stand, though not very firmly because the distance between the legs is not very large.

The legs are carved in accordance with proper proportions and peculiarities of their structure. Prominences of heel bones are emphasized as well as the joint between the ulnar and humeral bones of the foreleg. The joint between the legs and the body is delicately worked. It is shown in elaborate detail without any schematization: even muscle relief can be distinguished. However, the hoofs are schematically shown: they are not even split into two parts.

At first glance, the part of the body near hind legs has not been finished because a smooth line of the stomach continues to form a small prominence that occupies the entire space between the hind legs. As E.N Mashchenko, a paleozoologist, believes, this prominence shows an udder. From this consideration and the shape of the horns, the scholar considers this bison to be a female individual. We have no grounds to argue against this assumption.

What is depicted by the Zaraisk figurine?

Because of certain differences in the appearance of the American and European (wisent) bison, a question arises as to which animal this image depicts. From zoological descriptions, the following features distinguish the modern wisent* from the bison: (a) the wisent's head is smaller and higher; (b) its hump is not as large as that of a bison because spinous processes of thorasic vertebra of the wisent are shorter; (c) the wisent's croup is not truncated, and (d) the body and legs of the wisent are longer although its maximum weight is smaller. However, zoological descriptions of horns of both kinds of animals differ. Therefore, the most important features that distinct the wisent from the bison are the hump size and the degree of truncation of the croup. These features suggest that our figurine bears typical characteristics of both a bison (a large low head and a massive hump) and a wisent (a lower truncated croup).

Probably, this is a rather scholastic discussion on the question of which of the two animals, a bison or a wisent, is depicted. In this case, it is more appropriate to compare the figurine not with modern animals but with the ancient ones observed by the ancient sculptor. The earliest depiction of a bison is dated to the 16th century (Gerberstein, 1988: 193). This engraving was taken from nature in the royal forest in Mazoviya by request of S. Gerberstein for his book *Notes about Moskoviya* published in 1556. The animal depicted is more likely an American bison than a modern wisent. The same can be said about wisent images in the Paleolithic rock art of Europe.

Bone remains of the extinct European wisent suggest that it significantly differed from the modern wisent. Thus, according to N.M. Ermolova, who studied wisent bones at the Kokorevo-1 site on the Enisei River, the extinct wisent was much larger than the modern one (see (Abramova, Grechkina, 1985: 44 – 45)). On the other hand, modern bison and wisents are not identical. According to modern taxonomy, both the American bison (*Bison bison*) and the European bison, or wisent, (*Bison bonasus*) are divided into subspecies The subspecies of the American bison inhabit the prairie (*Bison bison bison*) and mountain–forest regions (*Bison bison athabaskae*). The European bison has the Belovegean or Lithuanian (*Bison bonasus bonasus Linnaeus*), Caucasian (*Bison bonasus caucasicus Satunin*), and Transylvanian–Carpathian (*Bison bonasus hungarorum Kretzoi*) subspecies. However, some zoologists believe that the differences between the subspecies are insignificant.

In the modern taxonomy, the extinct bison belongs to the species of *Bison priscus* with two subspecies – *Bison priscus occidentalis* (living in Siberia, Alaska, and Canada in the Late Pleistocene) and *Bison priscus mediator* (living in Europe and West Asia in the Late Pleistocene). Based on the examination of plant remains and studies of Paleolithic rock art images, biologists have firmly concluded that Late Pleistocene European bison (*Bison priscus mediator*) were very close to the simultaneously existing bison of East Siberia and North America (Zubr.., 1979: 74). Thus, the Zaraisk sculpture depicts a bison of the species of *Bison priscus,* which supports the above idea about close affinity between the extinct bison of Europe and America. The most indicative are the typical features of the ancient American bison, which can be described as follows: "The hump is large, with its highest point at the center; the back is bent downward right behind the hump... Because of a high sacrum and long hind legs, the back has no flat slope to the tail" (Ibid : 77).

Bison sculptures in Central and West Europe

As is known, the bison is the second animal after the horse to be depicted in the Paleolithic rock art. However, there are not many examples of bison sculptures found at the Paleolithic sites of West and Central Europe. There are two cave sites in the south-west part of Germany that yielded bison figurines: Vogelherd and Geissenklösterle with the Aurignacian cultural layers dated to the 32,000 – 30,000 years BP. The bone and lithic objects of these sites are technically and typologically identical. The pieces of mobiliary art (bison, lion, horse, and mammoth sculptures) found at these caves belong to the style of "realistic images with certain generalization"; nevertheless, the artistic expression and depiction manner of these sculptures are different.

A bison sculpture of mammoth ivory found at the Vogelherd site is stylistically unique (Fig. 3, *2*)

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* Here we mean the wisent, a European bison (*Bison bonasus*), whose original species has become extinct. The modern wisent that is bred in reserves is a hybrid of the American and European bison Generally, the word "zubr" is a Russian name of the wisent, coming into use in the 14th century. It sounds similar to the corresponding word in other East Slavic languages (Ukrainian, Polish, Czech, etc.) In Romano-Germanic languages, this word is *bison* (Lat , Fr.), *bisonte* (Sp.), *wisent* (Germ.).

(Adam, 1980: 22 – 23; Los comienzos..., 1989: 29 – 34; Bosinski, 1990: 67). The appearance of the animal is shown using an original technique: the sculptor tried to depict the bison's fur. This is a rare feature for Paleolithic sculpture. The fur is shown not by plastic means but with the help of ornamentation — frequent holes made on the sculpture surface. In general, ornamentation plays an important role in the Vogelherd sculptures. The animal mane is depicted as a slightly raised cylinder, which is typical of realistic and naturalistic Paleolithic art, in which manes are decorated with a cross pattern (horse) or frequent transverse notches (lion and bison) In some cases, a regular cross pattern covers limited parts of body sides (mammoth) or a muzzle (lion).

Interestingly, the bison sculpture from Vogelherd appears to be an imitation of a technique adapted for a soft, plastic material on a tough one. The image is rather flattened, similar in manner to a molded sculpture. A highly stylized beak-shaped head is not separated from the body. The mane and the hump joint together begin from the head and are highly stylized in the form of a prominent cock comb. The beard is shown in a molding technique (in clay, this is reached by simply pinching between a finger and the thumb): a narrowing lengthy part under the neck is emphasized by several parallel vertical lines, which depict shaggy fur. The legs are short and only slightly prominent. The sculpture is 7.5 cm in length.

A figurine from Geissenklösterle (probably a musk ox) is different from that described above. It is heavy, large, and strongly built. This is not a very successful attempt at a realistic depiction of an animal. The head and muzzle as well as ears and the tail are shown only in brief detail. The body is sculpted in the round The legs "joined" in pairs look like short branches of the body. The fur on the body is not shown even conventionally as it was on the sculpture from Vogelherd. However, a common feature of these two sculptures is that the head is not separated from the body and a low hump starts right behind the top of the undistinguished head. Obviously, these sculptures belong to the same artistic style, although the means of figure molding and the decoration of certain parts are greatly different.

Other bison images belonging to a later period are reported from the Isturitz Cave in the Pyrenees, where more than 180 marly and bone pieces of mobiliary art were found in two rooms in the middle Magdalenian layer. Among them, there are statuettes (both intact and in fragments) and slightly worked or engraved stone fragments. The statuettes are finished to different degrees. Some images can be easily identified, while others depicting animals are rather difficult to determine to a species or even a genus. Quantitatively, the horse was the most popular animal depicted (70 statuettes); the second most popular animals were members of the *Bovidae* family (bison, buffalo, etc.(?)) (45 figurines). Man was depicted extremely rarely. Most of the finds were found in fragments. This unique assemblage of Paleolithic sculptural pieces suggests that the Magdalenian layer of the Isturitz Cave contains a workshop for the production of sculptures (L'art préhistorique. , 1996: 236).

Concerning bison representations, this cave contains figurines made in low relief technique and engraved images as well as several detached figurines performed as round and flat sculptures (Ibid.: 238). The flat bison figurine is a bone plate showing an engraved contour image of a bison combined with engraved ornamentation. The most typical features of a bison appearance are elaborately developed: the animal has a massive forepart, a mane, a thick nape, a beard, and a high hump. The bison's eyes, a prominent nose bridge, nostrils, and a mouth are realistically shown by surface engraving. The tail is identical to that of the Zaraisk figurine: it is rather conventional, in the form of a short, slightly rounded prominence. The length of the figurine is 22 cm.

This plate with the engraved bison was broken in ancient times. It was assembled from two large fragments found outside a dwelling at a distance of more than 150 m from each other. The line of fracture passes through the chest of the animal. Smaller fragments containing lower parts of the body were not found. The fracture contour suggests that the plate was broken by several strong percussions.

Two round bison figurines from the Isturitz Cave (one figurine has bent legs) that were identified most reliably as bison were also found in fragments (hind parts of the bodies). A vertical fracture line passes through the chest. One of the sculptures has a notable trace of a percussion point on the fracture line. From this fact and the archaeological context of this find (the broken statuette was kept) we might assume that these figurines were broken intentionally in the ancient period. Stylistically, the sculptures belong to the Early Style 4 of the middle Magdalenian period ("classical").

Well-known examples of bison representations from the Tuc d'Audoubert Cave demonstrate another material and technique used within the same Style 4 of the Magdalenian period (Abramova, 1980). These are two large flattened clay figurines (length 61 and 63 cm) leaning against massive rocks. The bison figures are molded but the beard and the mane are shown with carved lines, i.e., as if they were on a hard material (stone or bone). These statuettes obviously show a male and a female bison. The male

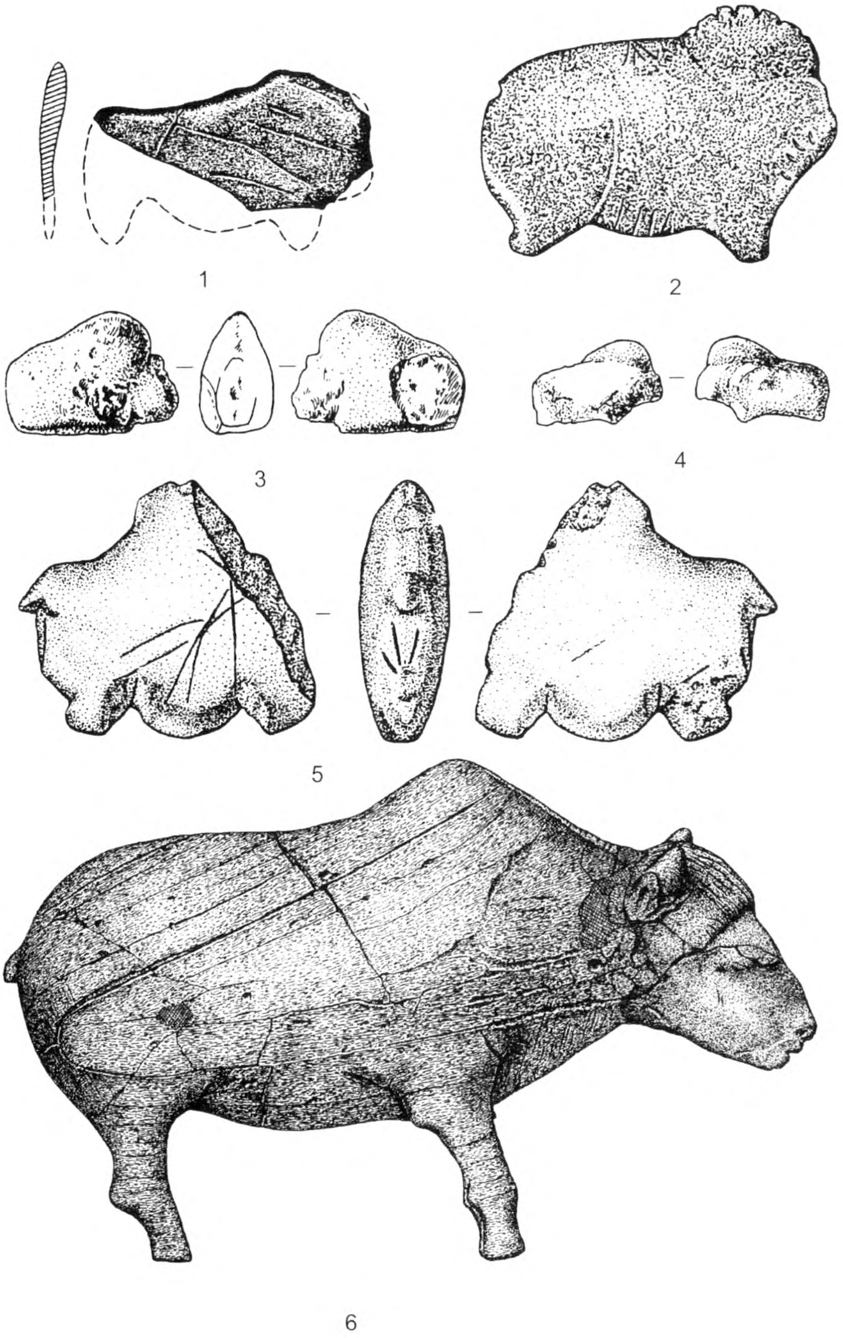

Fig. 3. Stylistic features of bison sculptures from the sites of East and Central Europe.
1 – Sungir (after (Bader, 1976)); *2* – Vogelherd (after (Kozlowsky, 1992)); *3 and 4* – Kostenki-4, level 1 (after (Abramova, 1962)); *5* – Kosautsy (after (Borziak, Chirica, 1996)); *6* – Zaraisk (drawing by A.E. Kravtsov). *1, 6* – bone; *2, 4* – ivory; *3, 5* – marl.

bison has a more prominent hump, a larger head, and a longer beard. The legs of both figurines are "joined" in pairs because the sculptor probably knew that these figurines would be leaning against the rock while he was molding them. Another flattened clay bison figurine was found at some distance from these two.

A clay bison figurine (length 12 cm) from the Labouiche Cave is stylistically similar to the Tuc d'Audoubert sculptures.

A sculpture of a "running bison" (length 11 cm, width 8 cm, thickness 2 cm) made of an antler from the Mas d'Azil site belongs to the late Style 4 (L'art préhistorique..., 1996: 265). Actually, this is not a sculpture but a weapon *terminal**, which were popular in the late Magdalenian period. This article was probably a base of a spear shaft. This realistic figurine is broken in the neck, and the head was not found. Some sexual characteristics shown in low relief suggest that this is a female bison. To denote a hump, a narrow prominent band decorated with vertical incisions runs from the nape to the tail and encircles the outer contour of the hump. On the left side, there are three long vertical cuts. Some traces of painting this figurine red have preserved. This running bison is full of expression.

Two large fragments of a bison marly sculpture were found in the Magdalenian layer of the Enlène Cave in the Pyrenees (Clottes, 1979) The fragment of the forepart is 7.2 cm long and that of the hind part is 5.2 cm long. Although this animal is shown statically, elaborate and finely finished details make this figurine similar to the previous one.

The above examples of mobiliary art virtually exhaust all reliable Paleolithic representations of bison found in Central and West Europe.

Bison sculptures in East Europe

Although Eastern European sites contain almost as many pieces of mobiliary art as the sites of West and Central Europe, bison representations are not abundant (Fig. 3, *1*, *3* – *6*). In addition to the Zaraisk site, undoubtedly bison figurines have been reported from only two other sites. These are Kostenki-4 (level 1) (Rogachev, 1955: 77; Rogachev, Anikovich, 1982: 76 – 80) with four marly bison figurines and Kosautsy in the Dniester River valley with one marly figurine found in layer 2a (most probably, a female bison) (Borziak, Chirica, 1996: 399). However, we believe that some other marly figurines still considered unidentified can be attributed to bison representations, such as those found at Kostenki-1 (layer 1) and Kostenki-11 (Anosovka-2) (Abramova, 1962: plate XIV, *4*, *9*; XXIII, *20*). Presumably, a fragment of a flat bone figurine from the Sungir site can be also identified as a bison image (Bader, 1976: 18)

Thus, undoubtedly bison figurines from the East European Plain were found only at Gravettian sites and one post-Gravettian site. Chronologically, these finds are within the range of 23,000 – 17,000 BP. Assuming the flat Sungir image to be a bison representation, it is possible to suggest the presence of bison images in the Streletsk Culture. However, these schematic images are stylistically different from the Zaraisk figurine. In addition, sculptures from Kostenki-4 and presumptive bison images from Kostenki-1 (layer 1) and Kostenki-11 are smaller in size. Z.A. Abramova describes the most interesting of them (3.5 cm length, 2.4 cm height, and 1.3 cm thickness) as follows: "A high prominent hump is sharply truncated from the rear. A small flat head seems to be ended with horns. The figurine base is horizontally cut. The sculpture is damaged by broad chips from the front on the right side and from the rear on the left side" (Abramova, 1962: 24) The style, size, artistic canon, and material of the Kostenki-1 bison figurines are analogous to the mammoth sculptures from layer 1 of Kostenki-1. One of these bison figurines with a flattened hump displaced towards the head is similar to the bison statuette from the Vogelherd Cave.

At the Kosautsy site, a bison figurine was found in the post-Gravettian (epi-Gravettian) layer dating to 18,000 – 17,000 BP. The legs of this bison are joined together, short, and pedestal-shaped. The figure and separate parts of the bison's body are highly stylized. The statuette was broken in the ancient period. The head and neck were never found in the layer The fracture line cuts the chest There are six engraved lines on the right of the stomach and the chest. Four of these lines are crossed on the chest. Although this figurine is stylistically different from the Zaraisk bison and several Kostenki bison, common between them is that they were seriously damaged. However, we cannot be sure whether this figurine was intentionally damaged because of the lack of detailed information about the circumstances of its depositing. On the other hand, we cannot deny such a possibility either because the reasons for disagreement must also be proved.

Thus, among the East European finds, the Zaraisk figurine is special, first and foremost, because of its unique stylistic characteristics

Stylistic analysis

The main goal of archaeological and stylistic analyses of pieces of Paleolithic fine arts is the classification of the objects studied. Specific, working classifications can be based on such characteristics as the material, technique, or objects depicted. However, the more general classification must aid in detecting and ordering the artistic styles. We believe that our main task in analysis of the artistic value of the Zaraisk bison is to give a stylistic determination within the existing typological systems.

As is known, for the Paleolithic art of West Europe there are two basic classifications claiming for universality, those developed by A. Breuil (1974) and A. Leroi-Gourhan (1995). For East Europe,

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*Any decorative adornment placed on top of an object (a rod or a weapon).

J. Kozlowsky (1992) developed a generalized scheme related to the two classifications above. A basic principle of a single-line progressive evolution of the Paleolithic art underlies the classifications of the French scholars. Breuil in his scheme distinguishes two successive steps in the development of the European Paleolithic rock art. Aurignacian–Perigordian and Solutrean–Magdalenian. In Leroi-Gourhan's scheme, based on the structural analysis of images, which was developed later (by the middle 1960s), the Paleolithic art of West Europe is divided into more detailed groups. He distinguishes four successive styles, which are described on the basis of rock art masterpieces because this branch of fine arts is better presented in West Europe. However, the principles used in distinguishing these styles can be applied to pieces of mobiliary art as well.

Style 1 ("first primitive") corresponds to the Aurignacian – early Gravettian period according to Leroi-Gourhan. Specific of this style is fuzzy contouring and incompleteness of animal bodies. Female sexual characteristics are symbolically expressed.

Style 2 ("second primitive") is dated to the Gravettian – early Solutrean period. Animal images are shown with a "sinusoidal" line contouring a neck and a back. Horns are shown either half face or en face in a distorted perspective. Legs are often absent or vague. This is the period of female sculptures called "Paleolithic Venuses."

Style 3 ("archaic") is dated to the late Solutrean – early Magdalenian time. Animal images of this period are shown in volume. The forepart of a body is exaggerated and legs are shortened.

Style 4 ("classic") flourished in the middle – late Magdalenian period. This style includes two stages: early and late. At the early stage, the details of an object agree well with one another, and figure proportions correspond well to morphological proportions of an actual animal. However, the postures of figures are constrained, and the animals are up in air. The mane is usually shaded. Fur covering various parts of the body is shown. At the end of this stylistic period, animal appearances are depicted in a more realistic manner (Leroi-Gourhan, 1995: 284).

Within this stylistic tradition, bison images are different from others. Their backs contoured by shaded details can be shown in two ways. In the first type, the exaggerated mane and hump are not separated; being placed behind the head, they look like a cock comb. In the second type, the mane and hump are smaller in size and separated from each other. According to Leroi-Gourhan, the latter tradition is younger than the first one. At this stage, it is possible to identify the sex of an animal even if sexual characteristics are not clearly shown. In comparison with females, male individuals have larger manes (Ibid.).

The discovery of art in the caves of Chauvet (Chauvet et al., 1995) and Cosquer (Clottes, Courtin, 1994) and a series of radiocarbon dates for certain paintings (especially for most ancient paintings in the Chauvet cave) raised the question of whether the principle of a linear evolution of successive artistic styles holds for Paleolithic art. However, excessive skepticism is also inappropriate in this case. This problem requires further investigation into dating new objects and a deeper insight into stylistic and chronological features of the Chauvet Cave art. If the results obtained contradict the evolutionary Leroi-Gourhan scheme, one should not jump to the conclusion to deny Leroi-Gourhan's styles. In this case, it would be more appropriate to extend the definitions of the styles presented and correct some chronological and territorial aspects.

Stylistic analysis of particular objects of Paleolithic art is reasonable only if it is performed within a certain general scheme. The significance of Leroi-Gourhan's classification is justified at least by the lack of other schemes that could be compared with it in terms of a number of sources as well as the insight into the problem.

The main terms used in the stylistic analysis of rock art and mobiliary art are "schematism," "realism," and "naturalism." Within these terms, the main stylistic feature of the Zaraisk statuette is its naturalism. The body and separate parts are shown extremely realistically. Each detail supplements others and none of them are emphasized to dominate the others. Anatomical proportions of the body are real, and the posture of the animal is natural. However, a certain trend to generalization is obvious. As was noted, the tail, udder, and hooves are shown only conventionally. Although the forelock, mane, and beard are shown in detail, the fur on the rest of the body is not shown. It is important to note that legs are separated from each other. This is not a first trial of a sculptor to show separated legs; they are quite natural though they preserve some features of "pedestal-shaped" legs typical of most Paleolithic sculptures. This figurine demonstrates a higher degree of artistic perfection in comparison with pieces of mobiliary art from the Aurignacian caves of Vogelherd and Geissenklösterle (34,000 – 30,000 BP) located in southeast Germany. Of interest is a comparison with the most impressive mammoth sculpture from the Geissenklösterle Cave (Los comienzos..., 1989: 28).

From the aforesaid, specific of the Zaraisk figurine is its naturalism in the depiction of the object combined with highly stylized features of appearance that are less important for the identification of the animal. Another more general characteristic is the intrusion of ornamentation tools into the technical toolkit of a sculpture. The elements pertaining to other fields of fine arts, such as ornamentation and engraving, were used to indicate details that are important for identification of the image (beard, mane) but could not have been depicted using exclusively sculptural techniques. Partial painting of the figure enhances this artistic syncretism. The bison was painted for other purposes than a mere artistic expression. Obviously, red color served to imitate a defeated and bleeding animal, which was important for the use of this figurine in a ritual.

Thus, following the classifications based on the materials of the Paleolithic art of West Europe, the Zaraisk figurine can be undoubtedly attributed to the second (Solutrean–Magdalenian) stage (according to Breuil) or to the "early Style 4" (according to Leroi-Gourhan). Based on an analogous scheme developed for the Paleolithic art of Central and East Europe, we consider a stage of naturalistic art in East Europe dating to the epi-Gravettian period. According to any of the classifications described, the Zaraisk figurine appears to have been made at least several thousands of years before the time when this artistic style developed.

Because of the uniqueness of the Zaraisk figurine in comparison with other pieces of mobiliary art from the sites of East Europe (see Fig. 3), we are to determine the reasons for such difference and to answer the question of to what extent the specificity of particular archaeological cultures is reflected in the artistic objects. Another question is whether the stylistic differences between the Zaraisk figurine and the sculpture from the Kostenki-1 site (layer 1) and Avdeevo are explained by different properties of the materials, which resulted in various molding techniques and degrees of finishing. However, the available data do not confirm this assumption.

The bison depictions as well as other sculptures found at the sites studied show that individual details and specific features of the animal or human appearances do not depend on the type of material. Stone female figurines from Kostenki are as perfect as bone ones Clay molded and burnt animal figurines from the Gravettian sites of Central Europe are identical in their artistic value to bone or ivory statuettes. A marly mammoth from the Avdeevo site is much more realistic than a bone mammoth statuette despite the fact that bone, being a more plastic material, is easier to be shaped.

Although the figurines of a mammoth and other animals from Kostenki-1 and Avdeevo look different from each other, they undoubtedly belong to the same style independently of the material used The main indicative feature is a line of the animal head and back. The proportions of the bodies are not precisely followed. The legs might be not shown at all or only briefly outlined. Although legs are sometimes shown (as in the case of an ivory horse (?) from the Avdeevo site), it does not contradict the general artistic canon of the Kostenki–Avdeevo culture. The legs of the Kostenki–Avdeevo animals are usually joined together, pedestal-shaped, and short; the appearance is not detailed. The animal appearances are usually not detailed. However, when the details are shown (a lion from layer 1 of Kostenki-1) (Abramova, 1962: plate XIV, 3), the animal figure is partially shown. All these characteristics coincide with those of Style 2, according to Leroi-Gourhan, despite the fact that his classification was developed on the basis of rock images for the Paleolithic of West Europe.

The artifacts found at the Sungir site suggest that the reason for the difference in style in the Paleolithic mobiliary art was not the material. At this site, ancient craftsmen used ivory, bone, and antlers. Bone carving was highly developed However, round sculpture was not found at this site in contrast to the Gravettian sites of the Central Russian Plain. This fact suggests certain relationships of various stylistic features and even forms of fine arts with particular cultural communities and/or chronological stages in the Paleolithic. On the other hand, the example of the Zaraisk figurine (and some other examples) shows that pieces of art can differ stylistically even within one Paleolithic archaeological culture (if we take the Kostenki art as a standard).

This idea is supported by objects of various cultures and periods of the Upper Paleolithic. Thus, predator statuettes from the Eastern Gravettian site of Pavlov (Pavlov I..., 1997: 274) and the Aurignacian cave of Vogelherd are much closer to one another than bison sculptures from the Aurignacian sites of Vogelherd and Geissenklösterle, which belong to the same culture and chronological period. If we determined the affinity of these three sites based exclusively on these artistic objects, the result would contradict the actual archaeological and cultural situation. There are many such examples; however, let us cite only two of them. Sculptures from the sites of Pavlov and Dolní Vêstonice are stylistically and canonically closer to the Aurignacian sites mentioned than to kindred Eastern Gravettian sites. Another example is a bison figurine from Kostenki-4 (level 4), which is closer to a bison figurine from Vogelherd not only stylistically but also in particular details (a flattened hump in the form of a cock comb) than to the Zaraisk bison. Note that the Zaraisk and Kostenki-4 (level 4) sites have a common Gravettian tradition and close dates.

Thus, objects of the mobiliary art do not necessarily reflect both archeological and cultural specificity of a site. This also holds for cases when individual art pieces are considered in isolation from the general cultural context. This also holds for the Zaraisk statuette, which is untypical of the Kostenki Culture both stylistically and thematically. However, one element attributes this figurine to the Kostenki Culture. This is the ornamental pattern in the form of an "oblique cross," which decorated the mane of the bison. As was noted above, this pattern was not included in the toolkit of sculptural art, but belonged to the symbolical or ornamental fields and was used independently to decorate various objects, not only sculptures. Hence, another question arises as to whether ornamentation, from the viewpoint of cultural identification, was a more indicative element than objects of mobiliary art. Probably, the answer to this question is positive if we take into account distinctive ornamental systems at the sites of various East European cultures (Kostenki–Avdeevo, Eliseevichi, Mezin, etc.).

Conclusion

The bison figurine from the Zaraisk site is a unique object because this is the most ancient example of the naturalistic style in the mobiliary Paleolithic art. Applying Leroi-Gourhan's classification of artistic styles developed for Paleolithic rock art to the mobiliary art, we attribute this bison to Style 4, whose date is 7 – 8 thousands of years later than that of the Zaraisk site. This contradiction contributes to the disputable question of the strictly successive nature of stylistic development in Paleolithic art. However, this is not a sufficient reason for revision of the principles of the Leroi-Gourhan concept because this would lead to the denial of any development of Paleolithic art.

The data given in the paper led to another general conclusion about the degree of reflection of cultural specificity in the Paleolithic art pieces. A comparative analysis of the materials shows that although the art pieces found at the sites of the same culture in most cases belong to the same style, they can differ stylistically. If we study the similarity and difference between sites on the basis of lithic tools or other utilitarian objects, we will obtain different results from those if we used artistic objects. However, the priority in distinguishing archaeological cultures is given to lithic inventory. Nevertheless, the archaeological cultures distinguished on the basis of exclusively lithic artifacts probably would not reflect objectively the ethnic characteristics of the ancient population.

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PETROGLYPHS AND THE QUALIFICATION OF BRONZE AGE MORTUARY ARCHAEOLOGY

Introduction

It is a truism that excavation archaeology reveals certain patterns of a culture's economic and social life, mortuary archaeology, in particular, reveals the rules by which members of that culture are consigned to death. The burial structure and ritual reaffirm ancient understandings of order both in this world and in the next. Regardless of his or her persona in life, the individual at death is reduced to a map of social and spiritual values – a map that mediates between the world of the living and that of the spirits. In this respect, the burial context represents a reaffirmation of ideal but possibly unreal order imposed upon the individual in the name of social continuity. Indeed, the burial context reiterates principles of belief, economy, and social status that may otherwise have been forgotten or even rejected within the lifetime of the dead person but which nonetheless serve to confer social legitimacy on both individual and society (Jacobson, 1987: 6 – 7; Pearson, 1982). The regularity of spatial order and burial goods within a set of Bronze Age burials, for example, points to commonly held traditions in which the particular tastes or idiosyncrasies of individuals and their households are subsumed to communal values. Of course, the experienced archaeologist identifies exceptions to the rules – an unusual vessel, an idiosyncratic ornament, even missing body parts. But the explanations of those exceptions usually avoid the instrumentality of individual choice by referring back to larger social and economic principles. An Okunevo-like vessel in an Andronovo burial, for example, is taken as an indication of the merging of the two cultures rather than as reflecting the personal preferences of the dead. Elaborate body ornamentation is understood as constituting marks of social status and wealth rather than functioning as signs of individual taste and personality Aged and sexed, even in death the individual is subsumed to the social whole; but as more than one study of mortuary archaeology has made clear, what we find in the ground, within and around the burial chamber, may only be an idealized reflection of a social myth handed down from generation to generation (Allen, Richardson, 1971; Brown, James, 1981).

Within the study of North and Central Asian petroglyphs, there is a strong tradition of seeking the general rule from the pictorial record in a manner paralleling the typological iteration of ceramic vessels or weapon types (e.g., (Devlet, 1998; Piatkin, Martynov, 1985)). Compositions and images are typically reduced to typologies: pictorial tables or lists of human figure types, specific animal types, boat types, chariot types, and so forth. Such typological displays indicate the figural possibilities within any petroglyphic site; but they do so only by disrupting the original physical and pictorial context. Where mortuary archaeology seeks to present the whole by enumerating the parts and then reintegrating them into drawn conceptions and theoretical conclusions, pictorial typologies adamantly refer to the part taken from the whole as a significant datum within the study of whichever culture was responsible for the pictorial record. In the case of petroglyphs, the "whole," would be a complex integration of stone surface (mineral type, size, shape, texture, and color), composition, orientation, and view shed, as well as the surrounding context of other petroglyphs and surface monuments. It could be argued that the result of taking one figure type from that integrated setting is as useful as taking a ceramic vessel out of its burial context, or a single character within an epic tale out of the larger narrative. One ends with an interesting artifact but with little sense of how that

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artifact was given a greater cultural life. The following discussion proceeds from a sense of the inadequacy of such an approach. Informed by a consideration of petroglyphic images within their integrated pictorial contexts, this paper seeks to complicate our understanding of the North Asian Bronze Age as it has been derived from the mortuary context.

The archaeological context

Before considering three extraordinary petroglyphic panels and their complicating imagery, it is useful to review briefly what we know of Bronze Age archaeology in South Siberia and specifically as it applies to the Altai mountain region. Here I am concerned with elements that indicate potential pictorial translations into rock art. The four relevant Bronze Age cultures include the Afanasyevo, the Okunevo, the Andronovo, and the Karasuk. Their dates, the specifics of their burial rituals, and the complexities attending their permutations are well known to the readers of this journal and need not be extensively rehearsed here. What concerns me now are the implications of social economy, burial structures and rituals for an understanding of rock art of the Altai region.

There are no pictorial elements associated with the mortuary context of the Afanasyevo Culture other than those resulting from a curious overlap with the Okunevo Culture in the Minusinsk Basin. The Afanasyevo people worked gold, copper, silver and meteoritic iron into tools and ornamental objects but without any figural elements. They seem to have used spears of stone as well as bows and arrows and to have practiced some hunting Overwhelmingly, however, their economy was based on the herding of animals and especially of cattle. Their distinctive pottery was ornamented with non-figural elements. Within the burial context, the vessels and a kind of rod or staff may have functioned as indicators of status (Vadetskaya, 1986: 21 – 22; Drevniye kultury..., 1994). The Afanasyevo Culture is sometimes said to have emerged from or to have been related to the more western Yamnaya Culture (ca 3500 – 2500 BC) (Vadetskaya, 1986: 22; Anthony, 1998). The Yamnaya people did use solid-wheeled wagons and carts, probably pulled by oxen (Ibid.), but there is no clear evidence for their use of horses for riding. The evidence that the Afanasyevo people used wheeled vehicles or horses for riding is indirect and unreliable (Okladnikov, 1968: 159 – 165; Anthony, 1998; Sher, 1980: 223 – 229). The Afanasyevo Culture is attested in the Altai and Sayan region by the late 3rd – early 2nd millennia BC (Drevniye kultury..., 1994: 134)*. There is some indication that the Afanasyevo Culture may have spread south as far as Xinjiang by the early 2nd millennium BC (Mei Jianjun, 2000: 58; Kuzmina, 1998: 72). Despite the lack of excavations in western Mongolia, some scholars have surmised that the Afanasyevo population spread from the Russian Altai and the Minusinsk Basin across western Mongolia (Novgorodova, 1989: 81 – 84; Drevniye kultury..., 1994: 134). In the Altai Mountains it may have continued down through the Bronze Age (Novgorodova, 1989: 39 – 49; Drevniye kultury..., 1994: 130 – 135). The possible pictorial elements that could derive from the Afanasyevo mortuary context include a staff or rod, ceramic vessels, cattle, and possibly but not probably wheeled vehicles. Herding scenes are more to be expected than scenes of hunting. Ornamentation such as the Afanasyevo people used on their ceramics is not found within the petroglyphic record. The presence of Afanasyevo sites in the Ukok region (Ibid.) increases the possibility that this culture could be a candidate in considering the cultural references of Mongolian Altai petroglyphs.

The Okunevo Culture is well established in the Minusinsk Basin, with regional variants in the Russian Altai (Kubarev, 1988; Molodin, Pogozheva, 1990; Molodin, 1992, 1993; Savinov, 1997). In the Minusinsk Basin it is believed to have emerged in the early 2nd millennium BC and to have been absorbed by the Andronovo people by the middle of that millennium. The Okunevo depended on both hunting and herding. There is no indication of horse riding, and aside from overlaid images on the well-known Znamenka stela (Sher, 1980: 223 – 229), there is no indication of the use of wheeled vehicles. An Okunevo pictorial tradition is well established through monumental standing stones and stone slabs from burials as well as by a number of realistic portable images (Leontjev, 2000). With only one exception, the specific elements of the Okunevo pictorial tradition do not seem to be represented in the petroglyphs of the Mongolian Altai. The single exception – that of a horned, anthropic figure found in several formulations at Tsagaan Salaa/Baga Oigor (e.g., (Jacobson, Kubarev, Tseveendorj, 2001, t. 2: plates 77, 106, 107, 208) – is so isolated from the larger pictorial context of the Minusinsk Okunevo Culture that it is not possible, in this writer's opinion, to conclude anything regarding an Okunevo pictorial tradition in the Mongolian Altai. For that reason the Okunevo Culture will not be considered further.

The Andronovo Culture spread out from the West Siberian forest-steppe in the 17th – 16th centuries BC and subsequently and rapidly over the Eurasian steppe (Kuzmina, 1998). A cattle dependency and the use of wheeled vehicles help to explain the extraordinary mobility of this culture. It has been attested in eastern Kazakhstan and Xinjiang province (Kuzmina, 1998;

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* But Mallory (1989 223 – 225) followed by Mei Jianjun (2000) puts the emergence of the Afanasyevo earlier, at the beginning of the 3rd millennium

Mei Jianjun, 2000), as well as in South Siberia from the Ob River to the Enisei and in the northern half of the Minusinsk Basin (Vadetskaya, 1986: 46 – 47). Within the Altai Mountains, Andronovo materials have been found only in the northern forested zone (Umanskii, 1992). To date, it has not been attested in Tuva or in the Mongolian Altai. Within the Minusinsk Basin, the Andronovo Culture is recorded between Okunevo and Karasuk cultural layers; it seems to have persisted, in various parts of the basin, between the 13th and 11th centuries BC (Vadetskaya, 1986: 46 – 47).

It is well established that the Andronovo Culture of Kazakhstan and Xinjiang had a highly developed bronze casting technology; but bronze finds within South Siberia have been relatively scanty (see (Grishin, 1971; Umanskii, 1992, Mei Jianjun, 2000)). Although wheeled vehicles and the use of Bactrian camels are firmly associated with the Andronovo of the Kazakhstan steppe and Xinjiang (Kuzmina, 1998), within the South Siberian extension of the Andronovo there is no non-pictorial evidence for these animals or for the use of wheeled vehicles or horse riding (Vadetskaya, 1986: 45). Across the Eurasian steppe and mountain-steppe, the Andronovo depended overwhelmingly on herding – of cattle, horses, sheep, and, less often, of goats. Since settlement areas within South Siberia have not revealed permanent structures (Ibid.), it might be assumed that they used portable shelters, perhaps moving in regular cycles to seek new pasture. Neither their ceramics nor their metal ornaments reveal a representational tradition. Kuzmina (1998) has concluded that the clothing of the Central Asian Andronovo people included caftan, trousers, boots, pointed caps or hoods, all made of felt, leather, fur and some woven wool textiles. There is no excavated evidence for the clothing of the Andronovo in South Siberia. Assuming that there could have been an Andronovo presence in the Mongolian Altai in the full Bronze Age (latter half 2nd millennium BC), pictorial elements indicating that fact might include figures in belted tunics and hoods, scenes of herding cattle, horses, or sheep, and representations of weapons and tools. Scenes of hunting would be less expected. We might expect to see some representations of Bactrian camels and wheeled vehicles.

Between the 13th and 11th centuries BC, the Andronovo in the Minusinsk Basin was replaced by the Karasuk Culture. The Karasuk origins remain a debated question: whether the Karasuk came from North China (Kiselev, 1951: 178), from the foothills of the Tien Shan Mountains (Sulimirsky, 1970· 307), or as the result of a natural cultural evolution within the Minusinsk Basin (Gryaznov, 1969: 97). A number of scholars believe that a significant component of the later Karasuk Culture derived from the Okunevo (Okladnikov, 1968: 164 – 170; Vadetskaya, 1986: 35; Savinov, 1997). The Karasuk physical characteristics, however, appear to indicate a relationship with Central Asian populations (Okladnikov, 1968· 180 – 187; Novgorodova, 1989: 122 ff.). By the 8th century BC, at the latest, the Karasuk was displaced by the Tagar (Vadetskaya, 1986: 65). More recently, serious questions have arisen regarding its absolute dates: whether, indeed, the culture including its Kammeny Log phase may not have ended before the end of the 2nd millennium BCE (Parzinger, 2000). The answers to these questions would have significant implications for all studies of the North Asian Bronze Age. Regardless of their resolution, the Karasuk Culture appears to have shifted from a settled pastoral-agricultural life style to a more focused dependency on cattle, sheep, and horses, and thus to a semi-nomadic way of life. Within the late Kammeny Log phase of the Karasuk, hunting was already of secondary importance (Vadetskaya, 1986: 60).

The Karasuk bronze casting tradition, the premier mark of the culture, was related to that of the Andronovo and North China, as well as to that of the succeeding Tagar Culture. One scholar refers to the burials at Ke'ermuqi, close to Aletai, Xinjiang, as indicating the association of northern Xinjiang with the South Siberian Bronze Age cultures of the 2nd millennium BCE and with the Karasuk Culture, in particular (Mei Jianjun, 2000: 15, 36, Hudiakov, 1995). Bronze objects assumed to be Karasuk have been found in Tuva, Mongolia, the Ordos, and North China. As of 1986, however, and with the exception of two Kammeny Log period burials in Tuva, there had been no Karasuk burials yet found in the Altai Republic, Tuva, or Mongolia (Vadetskaya 1986: 62 – 63). While it is possible that there was a Karasuk presence in the Mongolian Altai, that hypothesis remains unverified by scientific excavations The majority of Karasuk bronzes have been chance finds; however, the distinctive Karasuk curved knives with knob or circular ends have been recovered from Karasuk burials in the Minusinsk Basin and at least one spear mould is known from a Kammeny Log burial (Ibid.: plate V, pp. 55, 56, 62).

Evidence for riding and wheeled vehicles during the Karasuk is problematic. The find of one three-holed bone psalia from a Kammeny Log burial (Vadetskaya, 1986: plate V, *25*) points to horse riding by that period. The assumption that the Karasuk had wheeled vehicles is based upon the finds of yoke-shaped bronze objects in a few Karasuk burials (Vadetskaya, 1986: plate V, *28*; Novgorodova, 1989: 159 – 160; Varenov, 1984; Savinov, 1995) and on the well-known deer stones, associated by Novogorodova with the Karasuk period in Mongolia (Novgorodova, 1989: 173 – 201). Rather than be diverted here by a discussion of these objects or by the dating of the deer stones, let us simply say that since no parts of any wheeled vehicles have been found in Karasuk burials, since the identity of these yoke-shaped objects remains open to question, and since the excavated finds of the yoke-shaped objects are extremely few in number, the association of chariots or carts with the Karasuk Culture remains open to question.

Although related bronzes from North China indicate a tradition – one that might be related to the Karasuk Culture – of animal representation in the late second and early 1st millennia BC (Lin Yun, 1986, Parzinger, 2000), Karasuk ceramics lack pictorial representations. While the nature of their clothing is not clear, finds from burials indicate extensive metal and bone ornamentation worn by both men and women. Head ornaments indicate that the women wore their hair long or in ornamented braids (Vadetskaya, 1986: 54; Pavlov, 1995). Vadetskaya has referred to petroglyphic images in the Minusinsk Basin associated with the Karasuk Culture, but her description of these images suggests they bear little relationship to the imagery to be discussed below (Vadetskaya, 1986: 57 – 58). Nonetheless, petroglyphic imagery derived from Karasuk material culture might include representations of characteristic bronze implements, including knives, daggers, and yoke-shaped objects. Representations of hunters and of the hunt are possible, as are herding scenes, particularly of cattle. Images of women might indicate hair braided on either side of the head. It is possible but not certain that early images of riding and the use of wheeled vehicles might indicate Karasuk cultural traditions.

Having reviewed the pictorial possibilities that emerge from the mortuary context of the four relevant Bronze Age cultures, it is appropriate to turn to the imagery from rock art. The particular focus of this discussion will be petroglyphic compositions from the upper Tsagaan Gol, in Tsengel' *sum*, Bayan Olgiy *aimag**, Mongolia, but that material will be considered in relationship to rock imagery from other well-known sites: the large site of Tsagaan Salaa/Baga Oigor, Ulaan Khus *sum*, Bayan Ölgiy *aimag*; Yelangash in the Kosh Agach region and Kalbak-Tash in the Ongudai region of the Altai Republic; and a number of other sites in Mongolia, the Altai, Tuva, and Central Asia.** The compositions to be discussed are all datable, in the opinion of this writer, to the Bronze Age. I make that determination on the basis of a number of indicators: the figure type, the animal type, the weapon type; and the degree of patinization relative to adjacent images (not necessarily discussed)*.

Analysis of petroglyphs

The first composition is located on the north side of a small hill rising over the right bank of the Khar Salaa, a tributary to the upper Tsagaan Gol, a region best characterized as high mountain steppe (Fig. 1). The panel is a smooth, broad face of bed rock, measuring about 3 m in length and approximately 2 m at its widest section. The stone bears the elegant, irregular lines of ancient glacier scrape. Its color ranges from a deep red in the center to a blue-green and deeply veined section on the east end. The rock itself arrests ones attention, but even more compelling are the many images with which it has been pecked. Taken altogether, these images reflect several chronological layers, from perhaps as early as the developed Bronze Age (ca 3500 cal. yrs BP) to the Turkic period. For the moment, we are concerned with only two groups of images (Fig. 2): one involving a hunt for a wild yak; and the other involving a combat scene. Because of its main composition, this panel will hereafter be referred to as the Wild Bull panel.

In the center, six small figures surround a great bull facing to the right. It is represented with two legs, a long tail terminating in a large ball shape, signs of its male sex, and the massive shoulder of a yak. The animal's horns form a circle above its head. Its darkened body is deeply and densely pecked in silhouette, its outer contours are clear and clean. Just behind the bull's rump is a similar, but more gracile animal – a cow, it would seem, following the bull but incompletely pecked, its tail apparently terminating in a ball, its horns also circular in form. Just above the cow and facing to the left is a small bull, its tail balled, and its horns forward. To judge from style, pecking, and patina, this animal, another bovid just in front of the large bull, and several animals further to the right appear to have been done at a later date Five of the six small hunters surrounding the bull are of a similar type. One accompanied by a dog thrusts his spear at the bull's chest; two spear the animal in its belly. Another rams his spear into the bull's back, and a fifth figure – hardly discernible – appears behind the bull. Within the circumference of the bull's horns can be seen a small figure aiming his bow and arrow at the animal's head. At least three of these figures (two are too obscure to discern details) wear a familiar headdress associated with the Bronze Age. Usually referred to, awkwardly, as "mushroom shaped," it was most likely a hat of fur or leather and will be referred to hereafter as such. Hanging from their waists is a long appendage, sometimes called a "sack," a ritual tail or mace (Kubarev, 1987; Devlet, 1998: 161) but more likely to have been a kind of hair-tipped rod (Mongolian: *dalluur* used to this day by Mongolian nomads in hunting small animals).

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* *Sum* and *aimag* are administrative-territorial units in Mongolia equivalent to county and province respectively

** The field work on which this article is based has been undertaken by the author as part of the Joint Mongolian, American, Russian Project, "Altai," supported by the University of Oregon, the Institute of History of the Mongolian Academy of Sciences (Ulaanbaatar), and the Institute of Archaeology and Ethnography of the Siberian Branch, Russian Academy of Sciences (Novosibirsk). Principle investigators include the author, D. Tseveendorj, and V D Kubarev A full report of the upper Tsagaan Gol complex is in preparation by the Project members

* Space does not allow a fuller discussion here of the rationale for dating Bronze Age petroglyphs; but see essays by Jacobson in (Jacobson, Kubarev, Tseveendorj, 2001)

Above and to the left are several figures executed in a somewhat different style. These include a strange, enlarged person wearing either a belted jacket or a hanging gorytus, and a *dalluur.* He is surrounded by five figures: at least two have fur hats and one has a *dalluur.* One figure seems to be thrusting a long object at the strange figure and another aims his bow at the figure's back. Around and above the fighting figures are many other images, all differing in the degree of their patination and their styles, and thus suggesting later additions to the scene.

The Wild Bull panel is striking not simply because of the beauty of the selected stone surface and the excellence of the rendition of images. It presents a number of themes which should function as signs of culture and chronology. The first general theme is that of the hunt after a large animal. A sub-theme is the weapon of choice, here the spear, an object far less frequently seen in Bronze Age hunts than bows and arrows. In addition, several of the hunters wear the familiar rounded headgear and *dalluur.* Both elements are often considered to refer to a cultural milieu, specifically that of the Karasuk period (Okladnikova, 1984: 53; Kubarev, 1987: 161; Novgorodova, 1989. 165 – 167; Devlet, 1998: 161 – 163). The second theme presented by the panel is that of combat, including here a strange, enlarged figure. Even if this group was done later than the bull hunt, it is striking that it was added there, beside the central composition. Such an addition had to have been deliberate and possibly culturally significant.

The bull type we see here is unusually magnificent but not unprecedented. A close analogy, if much smaller, is offered by an elegant, racing bull from the upper Tsagaan Gol, pecked into a bluish rock surface (Fig. 3) Comparable, also, is the fine wild bull of a panel, also from Tsagaan Gol, including a deer, a hunter lost under lichen, and four wolves or dogs that race over the surface as if they were in flight (Fig. 4). Elsewhere one may find animals similar to the Wild Bull. A massive yak from Tsagaan Salaa I (Jacobson, Kubarev, Tseveendorj, 2001, t. 2: plate 35) impresses by its great humped body and the beauty of its execution; but its domesticated state is indicated by the loaded animal beside it (partially lost in lichen). If one looks just for bulls with balled tails, comparisons from other Altaic sites are numerous. A panel from Yelangash, for example, shows three evidently wild bulls, but their horns are all different from that of the Wild Bull and from each other (Okladnikov et al., 1979: plate 8, *5*). A finer comparison, also from Yelangash, has great horns and full sign of its sex, but it lacks a hump or a well-defined balled tail (Ibid., 1979: plate 66, *4*)*. In a composition from Baga Oigor III (Jacobson, Kubarev, Tseveendorj, 2001, t. 2: plate 329), an archer with fur headdress aims his bow at a group of wild cattle with large rounded horns and balled tails. A composition covering a whole boulder, from Baga Oigor I, offers an interesting comparison to the Wild Bull panel: bulls with large balled tails and rounded horns are attacked by dogs and archers (Ibid., t. 1: plate XVIII, fig. 225 – 227). This scene, however, seems to refer to a complex narrative (Jacobson, 1998): deer (*maral*) as well as bulls are the object of the hunt, and one archer stands on a stag's antler that has been extended to become the basis of a landscape. Massive wild yak with rounded horns and balled tails appear on a panel from Baga Oigor V (Jacobson, Kubarev, Tseveendorj, 2001, t. 1: plates 396, 397; fig. 1313), but here the animals are surrounded by archers, some with fur hats but at least one without. Elsewhere, in Baga Oigor IV (Ibid., t. 2: plate 355), a hunter shoots at a group of wild animals including a large bull with balled tail and round horns. In this case, however, the animal has four legs and the hunter wears a tunic and carries a compound bow – a clear sign of a date no earlier than the end of the Bronze Age.

The last composition, among others, indicates that a specific bull type – with round horns and balled tail – does not reliably indicate a specific culture and chronological horizon. Comparable bulls may also be found at Kalbak-Tash (e.g., (Kubarev, Jacobson, 1996: fig. 115, 183, 451)), but in every instance there is a significant difference: the type of horns, the treatment of the body or tail, or simply the theme of the composition. If we seek animals more comparable to the Wild Bull in terms of relative size and mass, one would have to turn to petroglyphs of Central Asia: to the bulls of Sarmishai, in Uzbekistan, or to some of the bulls with circular horns from Tamgaly, in Kazakhstan (Khujanazarov, 2001: fig. 7, 15; Samashev, 2001: fig. 20). But aside from the appearance of those bulls there is nothing within their compositions that parallels what we have in the Wild Bull panel. Coincidence and convergence appear to be operating here rather than any true cultural link.

In the case of the Wild Bull composition, the animal is unusual: his size and powerful form seem to reflect a process of myth making in which the prey assumes

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* Unfortunately, the drawings published in the volumes dedicated to Yelangash are difficult to use: they are consistently generalized and taken out of a larger pictorial context. For that reason, they are used here only hesitantly.

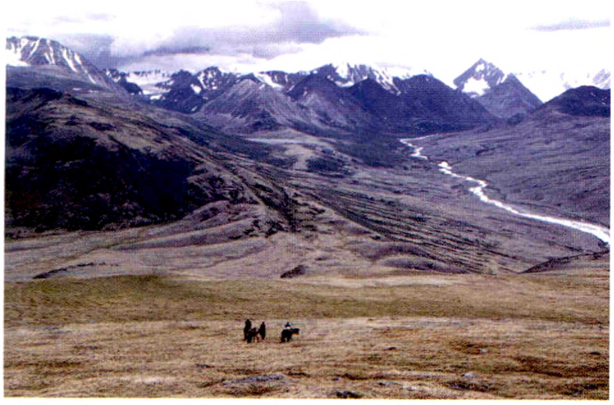

Fig. 1. Mountain steppe of the upper Tsagaan Gol valley. Photo by G. Tepfer.

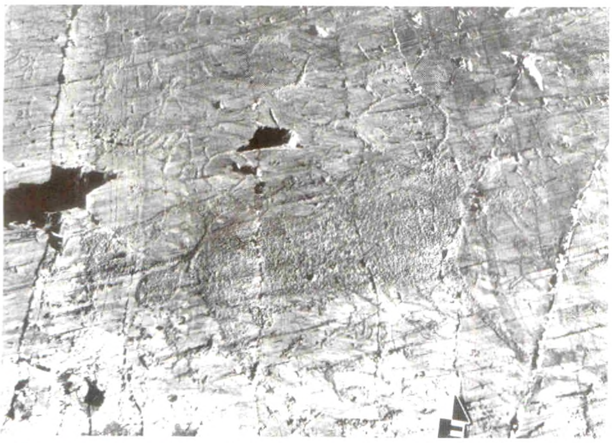

Fig. 2. Wild Bull Panel: composition with hunt for wild yak (center) and combat scene (upper left). Upper Tsagaan Gol complex. Photo by G. Tepfer.

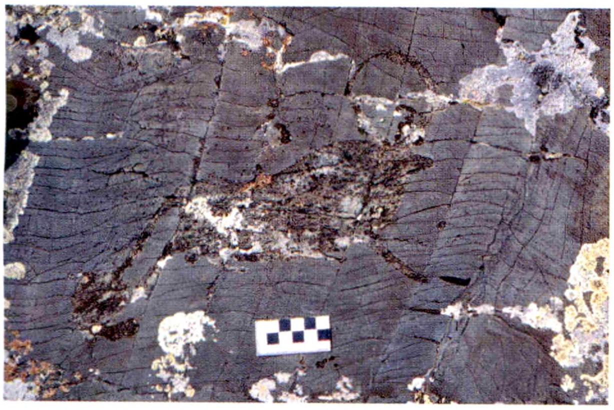

Fig. 3. Running bull. Upper Tsagaan Gol complex. Photo by G. Tepfer.

supernatural qualities. Such a process may refer to the emergence of an epic tradition long ago associated by Gryaznov with the South Siberian Bronze Age (Gryaznov, 1961). The motif of the mythically large animal occurs occasionally in Altai petroglyphs. In a composition from Baga Oigor IV (Jacobson, Kubarev, Tseveendorj, 2001, t. 2: plate 375), a small figure with "tail" and large fur hat aims his bow at a large and elegant bull with long, heavy tail. Other scenes from Tsagaan Salaa/Baga Oigor repeat the theme of the massive bull and small hunter. Examples include a scene from Baga Oigor IV of a large bull surrounded by archers in tunics and fur hats (Ibid., t. 1: fig. 1212), and a giant bull with elaborate horns hunted by a small figure with fur hat and *dalluur*, from Baga Oigor II (Ibid., t. 2: plate 282). More often, however, the mythically large animal hunted by small figures is a moose, elk, or wild ram, sometimes with fur-hatted hunters, but often not*. In other words, it is not possible to find exact parallels to the Wild Bull composition.

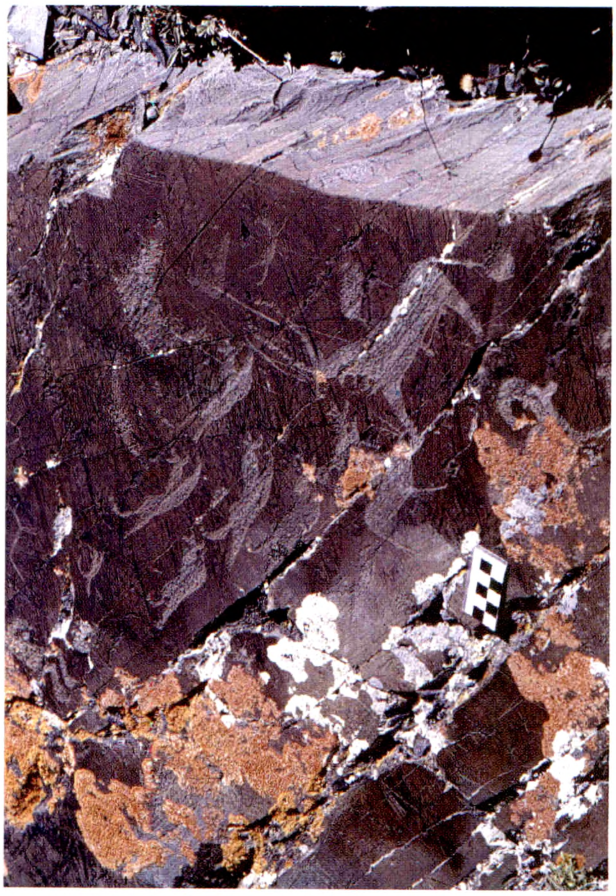

Fig. 4. Scene with wild bull, deer, "flying" dogs or wolves, and hunter in upper left. Upper Tsagaan Gol complex. Photo by G. Tepfer.

When spears occur in Bronze Age hunting scenes they are remarkable because they are unusual; in this

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* Cf. (Kubarev, Jacobson, 1996: plate 284) and a comparable handling of a moose in a scene from Tsagaan Salaa II (Jacobson, Kubarev, Tseveendorj, 2001, t. 1: plates III, IV); and a hunt with giant elk and moose from Tsagaan Salaa II. A comparable handling of a giant maral with small fur-hatted hunters is found at the Tsagaan Gol section of Khar Chuluut. See (Jacobson, 1997: fig. 23).

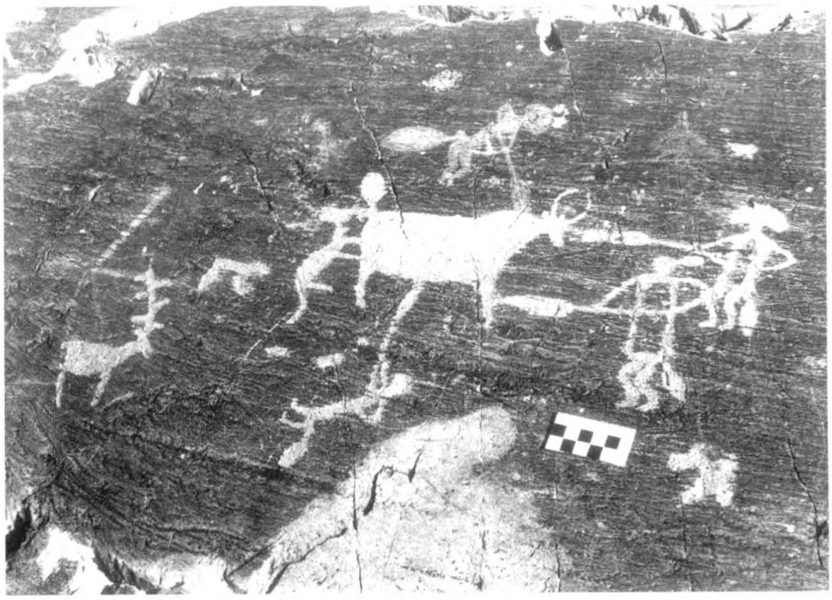

Fig. 5. Men with spears surrounding a wild bull. Upper Tsagaan Gol complex. Photo by G. Tepfer.

writer's opinion, they do not appear in hunting scenes of the late Bronze or early Iron Ages. Indeed, one might imagine that spears could function as a good motif to follow in order to find some kind of cultural pattern into which the Wild Bull panel might fit. In a small scene from the upper Tsagaan Gol (Ibid., t. 2: plate 902) (Fig. 5), a bull with short-balled tail and two horns arching upward is surrounded by attacking dogs and four figures who thrust their spears toward or into the animal. All the figures carry *dalluur*, but only three wear the fur headdresses; the forth has his hair (?) bound up in a long topknot. Although the theme is the same as that of the Wild Bull panel, here the bull and the figures are in proportion to each other, and all are executed with a static and uninspired figuration. In other words, despite the triad of wild bull, fur-hatted hunters, and spears, comparability with the Wild Bull group is weak. From Baga Oigor IV come three hunt scenes involving fur-hatted men with spears. The most interesting ("High Boar Hunt") includes strangely animalistic men surrounding a large boar and attacking it ferociously with spears and clubs (Ibid., t. 1: plate XXVII). One other, with hunters attacking a boar ('Small Boar Hunt'), is more schematic; as in the case of the High Boar Hunt, the figures wear unusually long *dalluur* (Ibid., t. 2: plate 379). In a third scene from the same section (Ibid.: plate 382), several mushroom-hatted figures are sticking what looks like a bear with their spears. These figures do not wear *dalluur*. An unusually impressive spearing figure comes also from Baga Oigor IV (Ibid., t. 1: plate XXVIII). Tall, thin, equipped with *dalluur*, quiver, large bow and long spear (Fig. 6), this figure rushes forward to attack – nothing. The artist apparently never finished either the hunter or the animal toward which his energy was directed. The image and those from the High Boar Hunt might suggest that in some particular cultural tradition such tall, thin figures were associated with spears. Unfortunately, such assumptions cannot be supported. In a beautiful example of such a figure from Tsagaan Salaa I (Ibid.: plate II), the hunter stalking a disproportionately large argali is an archer. A superb hunting scene from the Khar Chuluut section of the Tsagaan Gol complex (Fig. 7) involves about ten thin hunters using bows and arrows. Clearly, neither fur hats nor the combination of tall thin hunters plus spears bring us to a consistent pattern of imagery that could implicate a specific Bronze Age culture.

Although each pictorial element can take us in a variety of directions, the particular expression of the primary theme of the Wild Bull panel has no exact parallels in any recorded imagery of Altai and Sayan petroglyphs. A similar situation is created by the secondary theme of the panel – the group of figures above and to the left of the large bull (see Fig. 2). It was earlier said that these figures appear to be in combat, they seem to be wearing or carrying a variety of hats, *dalluur,* and even jackets, and one of these figures is larger than the others and somehow less human looking. Combat scenes are not common in Bronze Age imagery from Tsagaan Gol, Tsagaan Salaa/Baga Oigor, or other Altai sites; their numbers are vastly overwhelmed by representations of hunting, herding, or caravaning. The juxtaposition of hunt and combat recalls a large composition from Baga Oigor IV, where a group of fur-hatted figures on the top of the boulder are shown in combat, while around them and on the sides of the

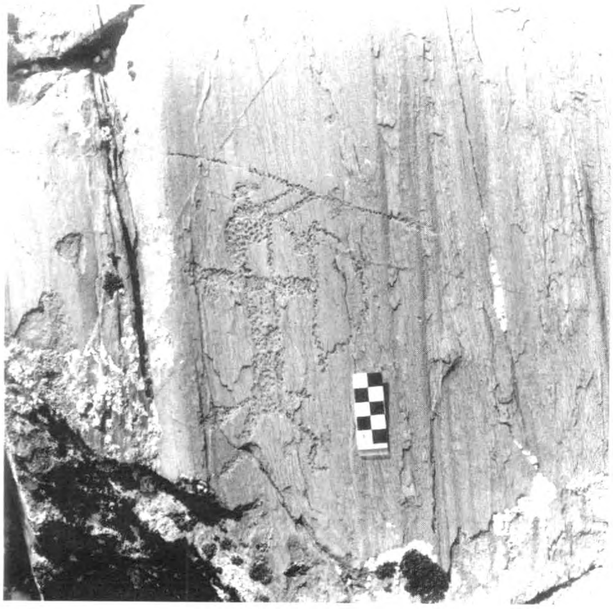

Fig. 6. Hunter with spear (unfinished). Baga Oigor IV. Photo by G. Tepfer.

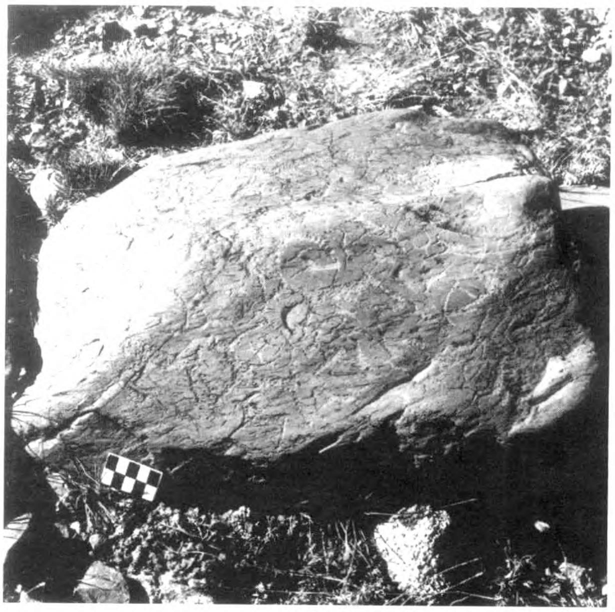

Fig. 7. Boulder covered with hunting scene: three archers on right shooting at fleeing animals. Upper Tsagaan Gol complex. Photo by G. Tepfer.

boulder are hunting scenes (Ibid., t. 2: plates 370, 371). In the hunt after a "mythic" moose at Kalbak-Tash (Kubarev, Jacobson, 1996: fig. 284), the small fur-hatted figures under the largest moose and holding spears appear to be directing their attentions at each other, rather than at the large moose. In all three examples, it is possible that the hunting and combat scenes taken together refer to strife over possession of ancestral hunting grounds. Even if the combat scene were added later to that of the Wild Bull hunt, the addition could have been a deliberate attempt to reconceptualize the theme of the Wild Bull hunt, to change it from a mythic hunt to a participant in the struggle for securing hunting grounds*.

Apart from the spear-holding combatants from Kalbak-Tash, the scene most similar to that of the combatants of the Wild Bull panel can be found on another extraordinary panel from the same hill. Located on the NW side and on a terrace about 30 m. higher than that of the Wild Bull panel, this one – here to be referred to as the Second Bull panel – is even larger and of a no less beautiful stone: smooth, almost polished, with a fine glacier scrape. The original block has been fractured in many large sections, and many of these breaks have preserved clean, sharp edges. On this panel there are actually two groups of armed figures. One (Fig. 8, upper right), includes a small and finely executed archer with horns, a large *dalluur*, and carrying what looks like a large gorytus, a second figure with fur hat, and a third figure. This last is frontal and broad bodied, with large legs and arms, extended fingers, and large rounded horns. This group may represent either a combat scene or a hunting scene. The large figure is both lively and curious, in many ways reminiscent of a "giant" with outstretched hands attacked by two fur-hatted archers, from Baga Oigor II (Jacobson, Kubarev, Tseveendorj, 2001, t. 1: fig. 826; t. 2: plate 243); or "giants" from scenes at Kalbak-Tash (Kubarev, Jacobson, 1996: fig. 451, 511); or the strange figure in the combat scene from the Wild Bull panel*. These figures are all done in a careful, refined pecking technique, as are some of the animals around them. The group demonstrates the possibility of varying headdresses – in this case, fur hat and horned headdress – within the same composition. Throughout Altai and Sayan petroglyphs, there are many examples of horned archers**. We may mention a figure holding a group of leashed dogs or horses, from Baga Oigor I (Jacobson, Kubarev, Tseveendorj, 2001, t. 2: plate 213); the hunters from a large panel in Baga

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* Groups of men in combat are not common in Bronze Age petroglyphs, although they do appear relatively often in compositions from the Scythian period (see, e.g., (Rusakova, 1998; Sovetova, 1995)).

* `Giants` also are recorded from sites along the middle Enisei region (Sovetova, 1995: 50, plate IV). In those cases, however, we do not know the imagistic context of these figures; and to judge from their weapons and headdresses, they all belong to a later (Tagar) period.

** Undoubtedly, the "horned headdresses" were actually animal heads with large ears, such as are worn even today by Altai hunters. Now, fox skins seem to be preferred, but at in earlier time other animals – such as snow leopards – may have provided the heads and skins for hunting disguise.

Oigor II (Ibid.: plates 255 – 258); a fine frontal figure holding a large knife, from Tsagaan Salaa IV (Ibid.: plate 157); two hunters hunting deer with bows and a balled instrument, hunting deer, from Yelangash (Okladnikov et al., 1979: plate 38); and, also from Yelangash, two figures with horn-like projections together with three figures wearing mushroom-shaped headdresses, and all carrying vertical rods (Ibid.: plate 56, fig. 1).

A more compelling parallel to the combat group of the Wild Bull panel is another group of figures on the south-west side of the Second Bull panel. This includes five tall men arranged in opposing areas (Fig. 9). Three have tall T-shaped projections on their heads; they carry large bows and from their waists hang long quivers. Two other figures have smaller bows, *dalluur*, and no obvious quivers. There are two other unclear figures and one scratched figure with a strange top-knot. Because of the depth of the figures' repatination and the shallowness of the pecking, it is difficult to determine if the figures with T-shaped headdresses are all aligned together, against the others, or if the combatants are mixed. The figures with T-shaped headdresses are curious. Except for one other single image from a stone not far from the Second Bull panel, the only close parallel I have found involves a group of four combatants or hunters, three wearing long animal-like tails, and all with a distinctive top-knot, from Khavtsgait, in Gov' Altai *aimag* (Olkadnikov, 1981: plate 93, fig. 4). Does the scene here reflect combat between intruders and local inhabitants, marked by the fur hats? If so, from what period? Or are we faced again, as in the other group on this panel, with the simple fact that headgear does not necessarily distinguish Bronze Age cultures one from the other? Indeed, it is possible that too much reliance has been placed on headgear as a Bronze Age cultural indicator.

The main images on the Second Bull panel are three large bulls, each parcelled and each with fanciful and beautifully formed horns. The largest is irregularly parcelled (see Fig 8). His tail ends in a long paddle-shape, and his great round horns are extended up and over the edge of the stone surface in snake-like curves. Although its sex is clearly evident, this is not a wild bull: a thin line leads from its fine head to a small and almost invisible frontal figure, unfinished but with hair indicating a woman. Despite the awkwardness of the bull's four legs, the animal as a whole is beautifully rendered. Just above the bull, on another section of the same rock face, are two other confronting bulls, each also with indications of its sex and with elegantly curving horns. Although these animals do not have the grace of the larger bull, they are impressive. That on the left is marked by a water pattern (Fig. 10), while the body of that on the right is filled with dots. In this case, the bulls are not attached to any figures, nor do they seem to be related to (or done at the same time as) the nearby animals; they do, however, appear to be contemporaneous with the largest bull.

Patterned or parcelled bulls occur frequently in rock art of the Altai Mountains. Several examples are found within the Tsagaan Gol complex including a large bull with "water pattern" markings, from a long panel in the Khar Chuluut section (Fig. 11). In this case the bull is loaded – thus clearly a domesticated animal – but it is surrounded by several figures, including one with fur hat and holding the bull by a long rope. This bull combines the disproportionate size of a "mythic" animal with indicators of both domestication and ritual significance (the load, ropes, and elaborate markings), in combination with the now familiar figures. A less impressive parcelled bull from Tsagaan Salaa IV, with large round horns, a balled-tail, and loaded with the family goods, is led by a small frontal female (Jacobson, Kubarev, Tseveendorj, 2001, t. 1: plate XIV). Some of the most impressive parcelled bulls are from Kalbak-Tash, but they also indicate an extensive array of possibilities. One has a "paddle tail," a load with child on its back, elaborately notched horns and neck fringe, while its body is a beautiful combination of circles and diagonal lines (Kubarev, Jacobson, 1996: fig. 429). Other more massive animals, also with paddle-tails, appear in complex compositions involving many other animals, hunters, women, and even carts (Ibid.: fig. 449, 451). Another composition (Ibid.: fig. 473) includes 19 parcelled bulls, all with a variety of horn shapes and eight of which are loaded with household goods or children. This composition alone indicates that neither horn nor tail type can be considered distinctive marks of a particular culture or chronology. Together with the large bulls of Khar Chuluut and the Second Bull panel, however, these images seem to indicate that only domesticated animals would be treated in a parcelled manner, at least during the Bronze Age.

It is remarkable that on the hill in question – henceforth referred to here as "Bull Hill" – can be found yet a third large panel marked by the images of two great bulls. Located higher than the Second Bull panel and oriented to the west, the stone surface is long, flat, polished, and beautifully textured by glacier scrape. In this case, much of its surface has been shattered into large sections and is covered with red lichen. The bull composition is incomplete: one of the animals was only begun and the other may not have been finished (Fig. 12). What we see, however, is quite unusual. The massive frames of the bulls are accentuated by contrasting, elegant, rounded horns and by exaggeratedly enlarged necks fringed in a scallop pattern. The upper, more finished bull, is parcelled and its tail is balled. The larger, unfinished bull's tail crosses over a densely pecked boar-like animal and ends in an elegant tassel.

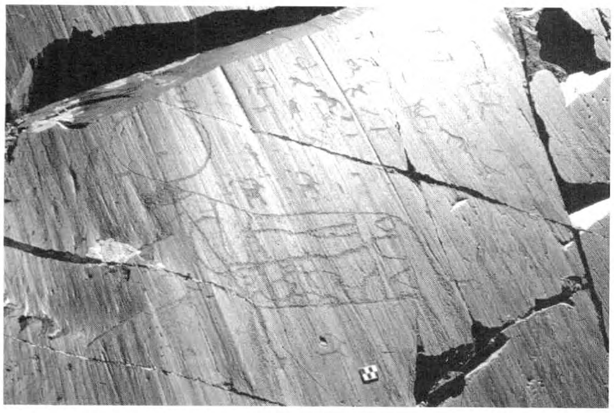

Fig. 8. Second Bull panel: large bull led by woman; combat or hunting scene above bull. Upper Tsagaan Gol complex. Photo by G. Tepfer.

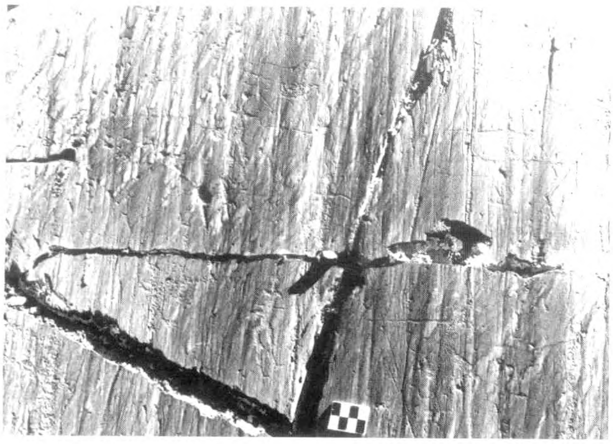

Fig. 9. Detail of combat scene in the right section of the Second Bull panel: five combatants with large bows and T-shaped headdresses. Upper Tsagaan Gol complex. Photo by G. Tepfer.

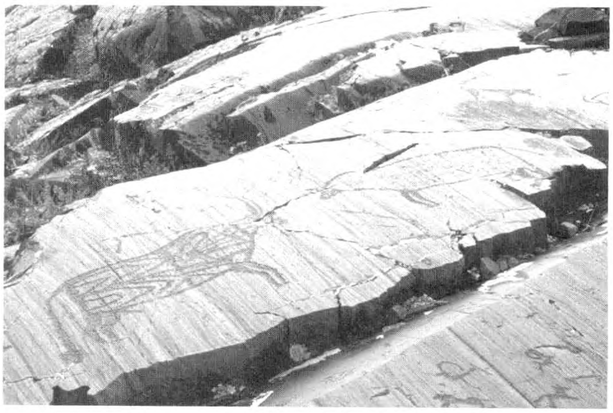

Fig. 10. Second Bull panel, upper section: two confronting bulls with interior markings. Upper Tsagaan Gol complex. Photo by G. Tepfer.

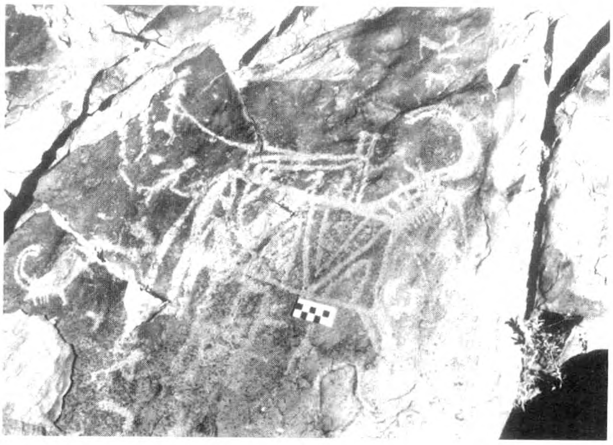

Fig. 11. Loaded bull with interior patterns. Upper Tsagaan Gol complex. Photo by G. Tepfer.

Their size and the elaborate treatment of their necks suggest a ritual function and recall a number of bulls from other sites – from Kalbak-Tash (Ibid.: fig. 473) and Baga Oigor IV (Jacobson, Kubarev, Tseveendorj, 2001, t. 2: plates 360, 361). Within the Third Bull panel, the upper bull is led by a small frontal woman with braids, while the lower bull is tethered to an enclosure. Within the enclosure is a small frontal figure, reminiscent of a child, while outside is a frontal stick figure and, possibly, one or two small animals.

For all the massiveness of the two bulls on the Third Bull panel, they were clearly intended to reflect some kind of domestic well-being – either in terms of ritually consecrated animals or in terms of a herd's fertility. In this regard, they recall many of the parcelled bulls mentioned above, as well as scenes involving men, women, children, bulls, and enclosures, such as several from Baga Oigor III (Ibid., t. 2: plates XXII, XXIII, fig. 327 – 330). Frontal females and females with what look like braids leading domesticated bulls occur frequently within Altai rock art, as do bulls – domesticated and wild – with neck fringe. One may mention examples from Yelangash (Okladnikov et al., 1979: plates 6; 16, fig. 1; 32, fig. 1; 84, fig. 1) as well as those already referred to from Kalbak-Tash and Tsagaan Salaa/Baga Oigor (e.g., (Jacobson, Kubarev, Tseveendorj, t. 1: plates XIV, fig. 281, 332, 393)). These scenes reflect a life of domestic well-being, within which cattle or yak take pride of place. But the Second and Third Bull panels pose a particular challenge: although they refer to a similar reflection on reality, where large, even magnificent animals, are joined to women and households, they do so in very different ways and with very differently imposing animals. When the women have braids on either side of their heads, they call to mind the indications in Karasuk burials that women may

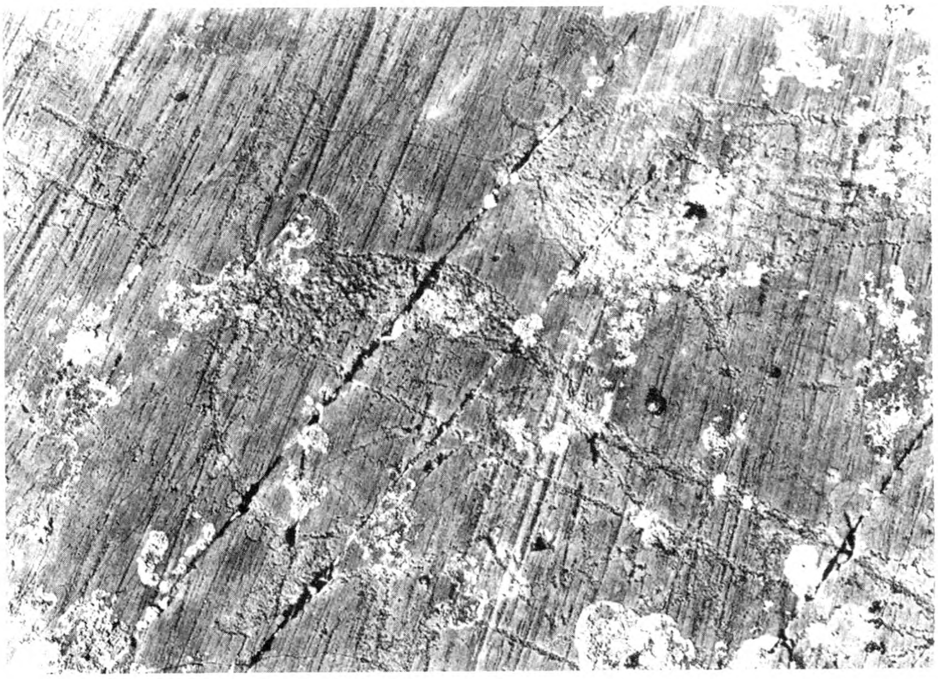

Fig. 12. Detail of Third Bull panel: forebodies of massive bulls attached to a small female figure (above) and an enclosure (below). Upper Tsagaan Gol complex. Photo by G. Tepfer.

have worn their hair in that manner (Vadetskaya, 1986: 54; Pavlov, 1995). The bulls share in common with the Wild Bull panel the vision of an animal as mythic in size and proportions. The Second Bull panel and the Wild Bull panel are juxtaposed with combat scenes reflecting, perhaps, the theme of strife around the securing of hunting grounds and household property. But the figure types seem to describe a variety of cultural references – horned, furred, with topknots, without topknots, with small and large bows or with spears – that lead in too many different directions to indicate a particular pattern of occurrences.

There are many petroglyphs on Bull Hill other than the three bull panels. None, however, match those of the bull panels either in size, in overall quality, or in sheer complexity. Bull Hill rises over the Khar Salaa and faces, on the north, the sacred mountain, Shivoot Khairkhan (Fig. 13). Otherwise there is no apparent way to explain the appearance of these three outstanding panels here on this hill. Perhaps the reason is fairly simple: the three rock surfaces are of such unusual physical beauty that they inspired those who first discovered them and others who returned to add further images and compositions. The style and subject matter of the Wild Bull composition would suggest that this panel is the oldest. The bulls of the Second and Third Bull panels, reflecting as they do a validation of domesticated animals and animal potency, suggest a later date, although nothing in their styles allows us to say which would have been done next. More likely each panel successively inspired the next one higher on the hill, at least with respect to the bull compositions. As far as the figures in combat are concerned, perhaps including "giant" figures, I suspect that in the case of the Wild Bull panel they were executed at a later date but still well within the Bronze Age, and that they represent an opportunistic use of the older composition to reflect on a struggle for hunting rights or to insert a reference to an established narrative. The combat groups of the Second Bull panel may also represent later additions to the large bull representations. The style in which the larger group of combatants was completed suggests a hand and vision other than that represented by the small group of figures. In any case, there are enough fine surfaces of rock nearby on the hill so that an ancient artist could have found his or her own "new" panel. But he chose, instead, to place his images beside the bulls; in doing so, he reflected complications in Bronze Age narrative that resist our desire to untangle their meanings.

Petroglyphs and archaeological reality

The earlier brief review of Bronze Age cultures relevant to a consideration of petroglyphs in the Mongolian Altai leaves us in a quandary. Of the four cultures considered, the Okunevo can be set aside as probably irrelevant. If we apply the measure of pictorial probabilities, the situation becomes more complex. The rods held by some figures wearing fur hats and *dalluur* – from Kalbak-Tash, Yelangash, Tsagaan Salaa/Baga Oigor, and Tsagaan Gol – might refer to the Afanasyevo ritual staffs. On the other hand, these figures are more often represented in hunting scenes than in scenes of herding – which tends to exclude an Afanasyevo attribution. Moreover, the identification of a rod as the sign of status in the Afanasyevo Culture is too uncertain to use as a specific signifier. In fact, the cultural significance of these elements remains open (Vadetskaya, 1985: 21 – 22; Drevniye kultury..., 1994).

The pictorial elements that might derive from the Andronovo Culture offer intriguing possibilities within the Mongolian Altai. Many scenes of men on foot wearing belted caftan and herding large cattle can be found at Tsagaan Salaa/Baga Oigor (e.g., (Jacobson, Kubarev, Tseveendorj, 2001, t. 2: plates 319, 320, 332, 374)). Other scenes include tall figures, without fur hats, but with cattle (Fig. 14). Invariably these scenes lack references to horse riding or wheeled vehicles. In the Tsagaan Gol complex there is one intriguing scene of such a figure in belted caftan shooting at two large maral. The animals are massive in style, quite unlike anything from the Early Nomadic period. One image of two figures in a wheeled vehicle from Tsagaan Gol is also quite distinctive: the figures are larger, more like those figures with belted caftan from other compositions. These specific elements (vehicle, caftan, and the large size of the figures) – none of which are evident in the three bull panels – may be indicative of an Andronovo presence. Such a hypothesis deserves further investigation.

As indicated earlier, the assumption of a relationship between chariot driving and the Karasuk Culture (Novgorodova, 1989: 141 – 142) is ultimately based entirely upon an object usually referred to as "of unknown significance" (Varenov, 1984, Savinov, 1995). Among the dozens of images of wheeled vehicles we have documented in the Mongolian Altai, not one includes a representation of this object. In fact the only representation of this object appears above the head of a fine frontal figure from Tsagaan Salaa IV, mentioned earlier (Jacobson, Kubarev, Tseveendorj, 2001, t. 2: plate 157); he wears a headdress with two vertical projections and holds a dagger with ring-butte and thorned hilt. By its form the dagger could be either Karasuk or Tagar.* A driver of a wheeled vehicle from Tsagaan Salaa V (Ibid.: fig. 680) may be wearing a similar headdress. A similar dagger is held by a large female (?) figure from Tsagaan Gol, overlain by a smaller, more recent figure (Fig. 15). In this case, in the case of another lightly engraved blade beside her, and with reference to yet another dagger image below the Khar Chuluut section, the thorned hilts and ring or knob buttes are clearly visible. If the yoke-shaped element, the daggers, and the woman with braids indicate a late Karasuk or even Tagar date, then presumably that would coincide with the period of cart or chariot driving.

The difficulty with using this sequence of imagery in order to propose a date for the wheeled vehicles in the Karasuk-Tagar period is that there is no consistency in the treatment of wheeled vehicles and their drivers in Altai petroglyphs. For example, within a single composition from Tsagaan Gol, with more than nine remaining "chariots" done clearly in the same style and by the same hand, the spokes on the paired wheels range from none to 16 (Fig. 16). Most of the figures – tall, thin, elegant – wear fur headdresses, some carry *dalluur*; they are, in other words, entirely different from the small figure of Tsagaan Salaa IV. On this remarkable stone there are also several images of cattle, but done in a crude style totally different from that of the men, their horses, and their vehicles. In many other scenes of vehicles, the horses are varied and the drivers are dressed with a variety of head gear and sometimes with, sometimes without *dalluur* (e.g., images from Tsagaan Salaa III and V (Ibid.: fig. 215a, 680)). Moreover, in none of the many vehicle representations from Tsagaan Salaa/Baga Oigor or Tsagaan Gol are there any elements to support the definition of these vehicles as "war chariots" or even as some kind of mythically charged vehicle. In all the cases just cited and elsewhere, the vehicles are represented with variously spoked wheels and various drivers; one has the impression of people out for a drive, enjoying the ease of their movement, and proud of their fine conveyances. At most, these vehicles might have been used in hunting; that is certainly how they are very occasionally represented (Ibid., t. 1: fig. 590, 870; t. 2: plate 178). But how that would have been practical in the extremely rocky and uneven terrain where the images are found remains a puzzlement. Moreover, in a composition from Tsagaan Salaa IV (Ibid., t 1: fig. 590), the driver of the vehicle (with solid wheels!) chasing a deer is totally different in type from those shown hunting. The latter, with their enlarged fur hats and *dalluur*, are closer in style to the spear holders of the Wild Bull panel.

The female figure with braids and a dagger (see Fig 15), takes us back to the female figures in the Second and Third Bull panels. It also recalls the many figures of women in Altai petroglyphs – also with braids, also with either caravans or cattle.* The varied settings and stylistic renditions of these several compositions are

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* See (Vadetskaya, 1986. plate VI, fig 10) and compare (Jacobson, Kubarev, Tseveendorj, 2001, t. 1 fig 807) from Baga Oigor II, where a different kind of figure holds a large knife

* E.g., woman leading two loaded bulls, Baga Oigor I (Jacobson, Kubarev, Tseveendorj, 2001, t. 2. plate 212), woman leading a packed bovid, Tsagaan Salaa IV (Ibid , t. 1: plate XIV); woman with braids leading a loaded bull, Baga Oigor III (Ibid.: plate XXIII); woman standing near the scene of a skirmish involving a large loaded yak, Baga Oigor III (Ibid plate XXIV), and so forth See, also, from Yelangash (Okladnikov et al., 1979. plates 16, fig 1, plate 32, fig. 7).

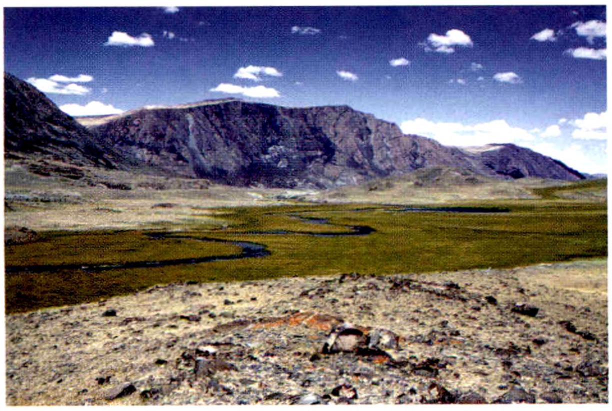

Fig. 13. View of the Khar Salaa River, Bull Hill in right center and Shivoot Khairkhan on far left. Upper Tsagaan Gol complex. Photo by G. Tepfer.

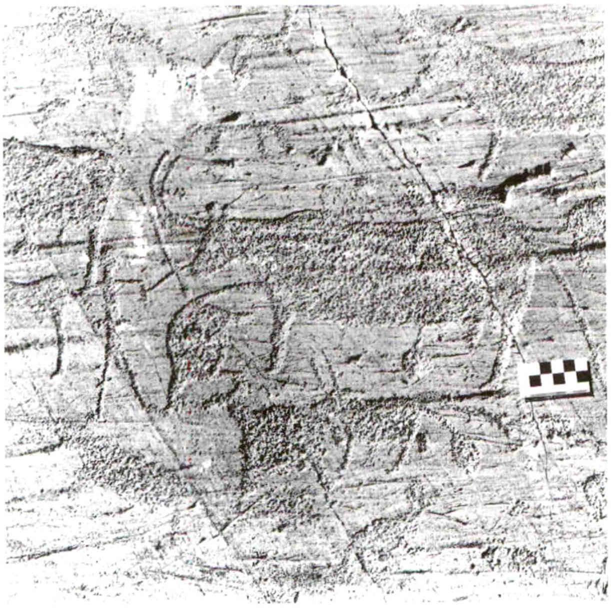

Fig. 14. Detail from a herding scene with men, cattle, and horses. Upper Tsagaan Gol complex. Photo by G. Tepfer.

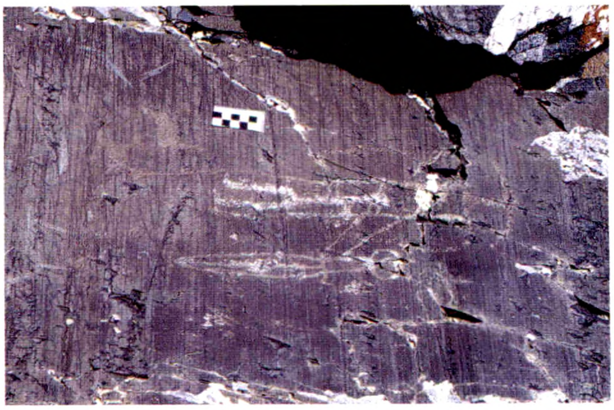

Fig. 15. Large frontal female figure holding a dagger and overlaid by a more recently pecked small figure. Upper Tsagaan Gol complex. Photo by G. Tepfer.

collapsed into one cultural verity: the figures are all associated with a cultural stage joining domesticated cattle to the movement of households. In a beautiful composition from Baga Oigor III (Ibid.: plates XXIII; fig. 330, 979, 980), two wheeled vehicles are present in the same scene with a woman with braids who leads a loaded bull. In contrast to the indications of the composition with nine vehicles from Tsagaan Gol, this one reflects a period involving cattle herding, the movement of households and the use of wheeled vehicles.* On the other hand, throughout the rich sites of Tsagaan Salaa/Baga Oigor and Tsagaan Gol, the very lack of uniformity in the rendition of wheeled vehicles, their horses, and their drivers (where present) strongly indicates that wheeled vehicles were used over a long period of time and probably refer to more than one culture. To automatically assign all vehicles and their related imagery to "Karasuk" raises far more problems than it resolves**.

Conclusion

Following the pictorial leads from the three bull panels has taken this discussion in many directions but it ultimately returns us to an unavoidable conclusion. The world reflected in North Asian Bronze Age petroglyphs – and particularly those from the Altai Mountains – is considerably more complex and more nuanced than anything indicated in presumably contemporary burial practices. Indeed, the possible permutations of subject and style within any group of related compositions is almost as varied as life itself. And that is both the problem and the opportunity presented by petroglyphs. An image taken from its context and reduced to a typological element loses essential qualifiers both with reference to the nature of its activity and to its possible cultural chronology. By contrast, the contextualized consideration of related images quickly reveals that

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* Another example appears in a composition from Kalbak-Tash (Kubarev, Jacobson, 1996: fig. 449), where a blockish frontal figure beside a loaded bull may have had hair on both sides of her head. In front of a second and similar bull, is a small vehicle without driver or horses. This vehicle seems to have been inserted, almost as a space-filler. It is uncertain how it would relate to the representation.

** The theme of horseback riding cannot be addressed here, but a number of outstanding panels from Tsagaan Gol make clear that horseriding was well developed in the Bronze Age and at a time contemporaneous with the well-known fur hatted figures. This motif – which will be developed in other contexts – also complicates our understanding of the Bronze Age in the region of the Mongolian Altai.

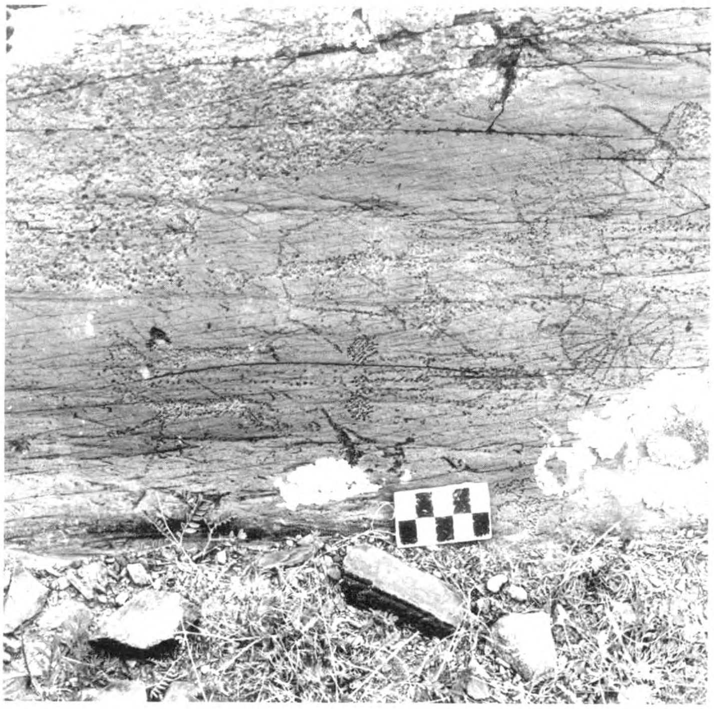

Fig. 16. Detail from a scene with more than nine vehicles: vehicle with spoked wheels, moving right and vehicle with solid wheels, moving left. Upper Tsagaan Gol complex. Photo by G. Tepfer.

many elements – spears, certain kinds of headgear, loaded bulls, wheeled vehicles, and so forth – assumed to be associated with one specific culture may well have had a number of cultural references. The fundamental complexity of using image types as cultural signs is further increased when we recognize that however "realistic" the representations we are examining, we cannot be certain they refer to contemporary reality. Many of the hunts and herding scenes may reflect the world around the artists who pecked out those compositions, but they may also reflect the realms of myth and memory, the permutations of generations of story telling. Regardless of the source of the imagery, however – direct observation, myth, or memory – the formulations used by North Asian Bronze Age rock artists to convey content are rooted in the world of phenomenal being. The very variety of imagery we have been examining indicates that we do not yet understand cultural layers in Bronze Age petroglyphic records nor do we necessarily know the full range of Bronze Age cultures and their variations in that part of the world. In short, petroglyphs cannot be adequately approached through the rules of material culture; they do not submit to typological analysis because they emerge from expressive and thus less regulated human impulses. By their very nature, they deny the conservative and idealizing traditions that dominate the burial rituals of their ancient cultures. The vision of life seen through Bronze Age petroglyphs is much richer than can be found in any mortuary context. If we are to understand the Bronze Age, that view of life must be factored into the cultural understandings we derive from excavation archaeology.

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THE METAL AGES AND MEDIEVAL PERIOD

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STARYI TARTAS-4 BURIAL GROUND: NEW DATA ON THE ANDRONOVO CULTURE

Introduction

The Andronovo cultural–historical community is a unique phenomenon of the Bronze Age. Archaeological sites of this culture are spread over the vast territory of North Asia. The West Siberian forest-steppe region was also a residence of the Andronovo population, whose cultural and historical traditions have been archaeologically studied for more than 100 years (Pozdnyakova, 2001: 89). The Andronovo "problem" was discussed in dozens of monographs and hundreds of papers (see, e.g., (Kuzmina, 1994: 281 – 359; Matveev, 1998: 380 – 396; Erlikh, 1994; etc.)). However, in studying the Andronovo cultural entity, archaeologists still face a number of unresolved problems concerning, for example, the reconstruction of the semantics of the burial rite, the decoration of the Andronovo ceramics, the social and demographic structure of the society, the common and distinctive features of local cultural traditions within a large area occupied by the Andronovo population, etc.

One of the key points in solving these problems is complete investigation of new sites (both settlements and burial grounds) using up-to-date methods of field archaeology. Although many Andronovo or Andronovo-like (Andronoid) necropolises has been recently studied in the West Siberian forest–steppe (Abdulganeev, Kiryushin, Luzin, Shamshin, 1996: 11 – 20; Bobrov, Goryaev, 2000: 226 – 230; Kiryushin, Luzin, 1993: 67 – 94; Kovtun, Goryaev, 2001: 53 – 63; Papin, Pozdnyakova, Shamshin, 2001: 435 – 459; Tishkin, Pozdnyakova, 2001: 460 – 464; Shamshin, 1997: 326 – 331; etc.), there are only a few completely excavated burial sites whose materials were thoroughly published (see the latest review of the Andronovo sites excavated in the Upper Ob River basin and the corresponding burial ritual (Kiryushin, 1995: 58 – 75)).

The materials from the burial site of Staryi Tartas-4 were published only partly (Molodin, Novikov, 1998: 57, fig. 70; 83, fig. 94; Molodin, Novikov, Grishin, 1998: 294 – 299; Zhemerikin, 1999: 366 – 371).

Site description. Excavation results

The burial site Staryi Tartas-4 with barrows (*kurgans*) was discovered in 1982 by V.A. Zakh. It is located 1.5 km southeast from the Staryi Tartas village (Vengerovo administrative district, Novosibirsk Province) on a high (7 – 9 m) terrace on the left bank of the Om River (Fig. 1). The terrace has been extensively ploughed during several decades, and at present, the site area is being intensely destroyed by wind erosion. These activities led to the destruction of individual burial mounds. V.A. Zakh reported 21 mounds of various diameters that were grouped in several chains oriented from north to south. The 1994 inventory of archaeological sites of the Vengerovo district performed by the authors revealed only 19 burial mounds (Fig. 2). Because of large-scale destruction, the West Siberian expedition of the Institute of Archaeology and Ethnography started rescue excavations at the site.

Fifteen round mounds 6 – 13 cm in diameter and 0.2 – 1 m in height (from the modern surface) comprise a compact group and four other kurgans of 11 – 20 m diameter and 0.3 m height are at a distance 15 – 90 m to the west of this group.

The stratigraphy of the site is as follows:

1. Humus – up to 10 cm.
2. Mounds 80 cm thick constructed of dark gray loamy sand.
3. Yellow sandy loam with permafrost cracks filled with gray loamy sand; the original layer.

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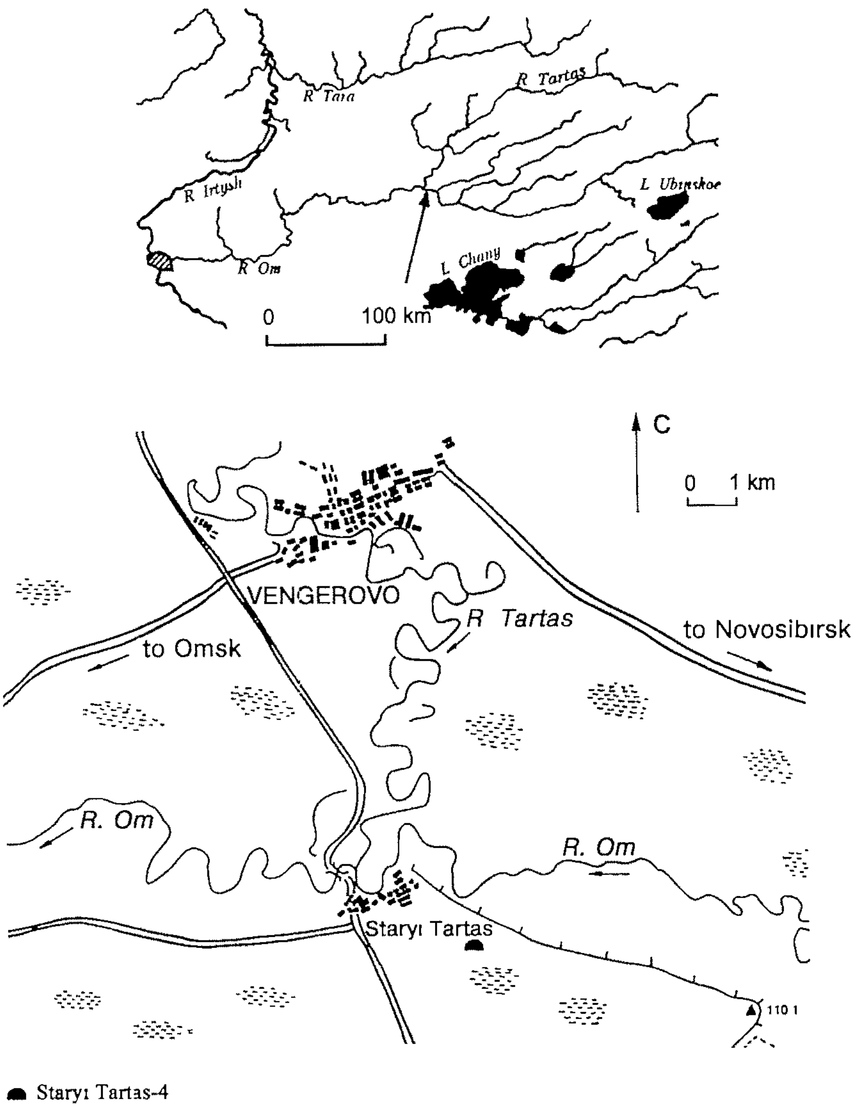

Fig. 1. Schematic map of the Staryi Tartas-4 burial ground.

4. In the central part of several mounds there are "lenses" of yellow loamy sand 10 – 15 cm thick located above the original surface in the layer of dark gray loamy sand. Obviously, these are traces of soil removed from burial pits.

5. Some stratigraphic profiles show traces of fireplaces: bright red spots of loamy sand.

At the site, various sets of ceramics and other grave articles as well as different variants of the burial rite were found (see Table). For more detailed information, see the 1995 – 1998 excavation reports by V.I. Molodin deposited at the Excavation Department of the Institute of Archaeology RAS and the Institute of Archaeology and Ethnography, SB RAS.

In addition to 23 burials found under 19 excavated mounds (Table), we found two pit graves that undoubtedly belong to the site studied.

Pit Grave 1 is located near kurgan 2. The rectangular 1.14 × 0.74 × 0.41 m burial pit is oriented along the northeast – southwest line. A child skeleton has preserved poorly, so it is impossible to reconstruct its original position and orientation. A vessel is found near the southwest pit wall.

Pit Grave 2. Fifty-six pits grouped in rows were found north of kurgan 16. The external rows of pits forming a rectangle with sides of 7 × 4.8 m were oriented along the northwest–southeast line. We found a large pit and grave 2 in the center of the rectangle. The pits are divided into two groups: the first group includes 14 pits of similar size and shape filled with bright gray loamy sand and rare inclusions of the original soil (yellow sandy loam), and the pits of the second group of different size and shape form the rectangle. The pits of the latter group are filled with dark gray loamy sand.

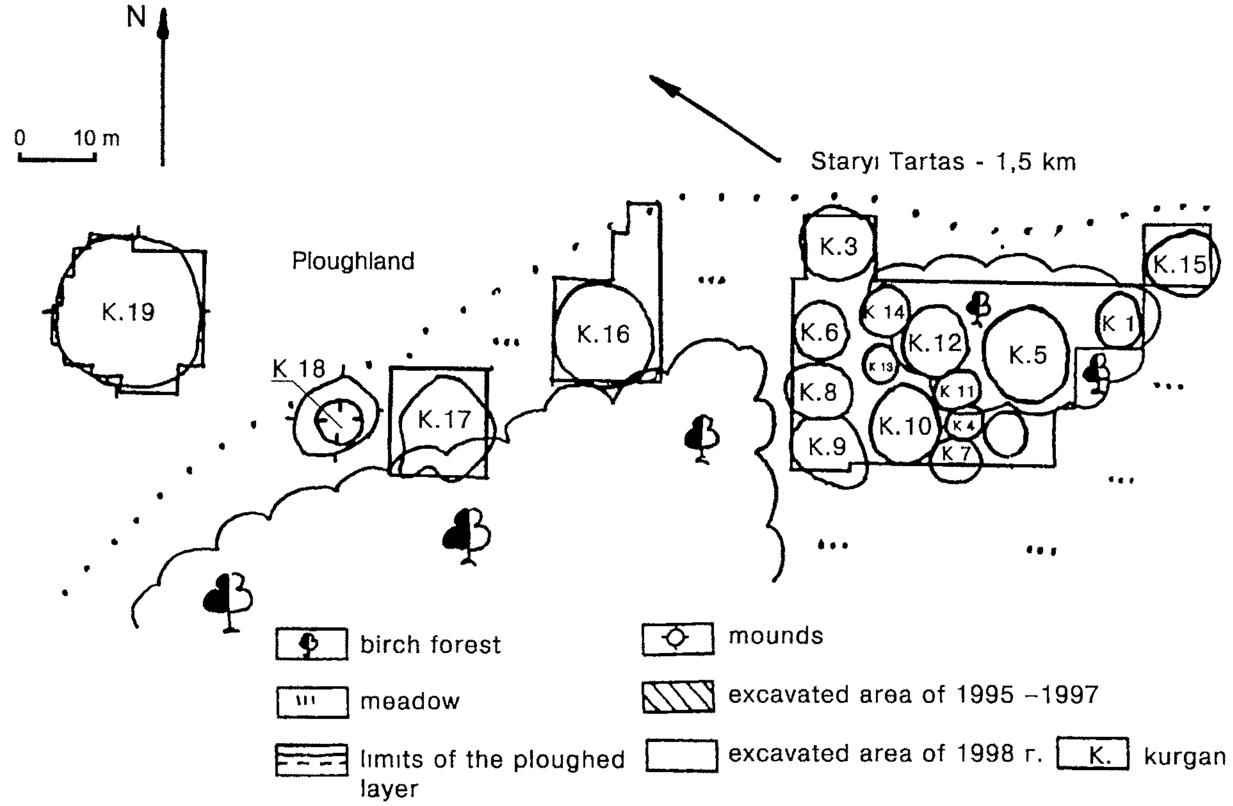

Fig. 2 Plan of the kurgan burial ground of Staryi Tartas-4 with contours of excavated areas

Because the burial pit does not cut the original layer, we can establish only its approximate size (1.5 × 0.65 m) The grave contained a child skeleton. Despite a poor condition of preservation, it is evident that the child was buried crouched on the left side with its head to the southwest. There were no goods in the grave.

Totally, 18 burial mounds of 19 recorded, which contained 25 burials, were excavated at the Staryi Tartas-4 burial site. We did not excavate kurgan 18 since it was seriously destroyed by robbers, nor two other burial mounds reported by V.A. Zakh but undetected by our expedition, which were destroyed by plough machines.

Site planigraphy

The kurgans on the site plan are clearly divided into two groups. the first group consists of kurgans 1 – 15 and the second includes kurgans 16 – 19 (see Fig. 2).

Conventionally, we distinguish that the core of the burial ground is kurgans 2 – 14, the western section includes kurgans 16 – 19, and the eastern section, kurgans 1 and 15 (plus two destroyed constructions). The kurgans comprising the central group are differently arranged on the plan: the first group has kurgans 3, 6, 8, and 9, stretched in line from northeast to southwest and the second group contains three large mounds (kurgans 5, 10, and 12), six small mounds (kurgans 2, 4, 7, 13, and 14 with child graves), and pit grave 1. In the central group, a dominating position is given to larger mounds with adult burials (judging from the mound size), and the peripheral sections contain smaller mounds constructed above child burials.

Burial architecture and rituals

Generally, all earthen mounds, which are round or oval in plan, are easily divided into groups based on their sizes and elements of the outer construction. The diameters of mounds built above adult burials vary from 7.5 to 21.5 m, and those of "child" burials vary from 6 to 14.5 m. The height of the "adult" burial mounds (from 0.3 to 0.9 m) exceeds that of child burials (from 0.1 to 0.58 m).

As a rule, builders made fire during construction of the earthen mound above a burial chamber; the traces of fire (one or several red spots) were found in 13 (72.2%) of 18 kurgans. Obviously, this evidence suggests that fire was a traditional element of the burial rite in this culture. Remains of a burial feast including fragments of the Andronovo ceramics and animal bones found in the burial mounds are exceptional rather than regular (6 kurgans (33.3%) of 18).

The kurgans constituting the western section differ not only in their location but also in the special elements of their construction that are found in all three kurgans: there are pits (ditches, a grave, and a sacrificial pit) on the four sides of the central burial (burials).

Under the mound of kurgan 16, there are three ditches and a sacrificial pit around the central burial.

Kurgan 17 contains two ditches around the central burial, and instead of the expected third ditch there is a child grave (Fig. 3, *1*).

Kurgan 19 has four long ditches around central burials, and one burial contained burnt bones in a vessel (Fig. 3, *2*).

Ditches under the mounds of several Andronovo kurgans were found in the Baraba Steppe (Molodin, 1985: 105) and in the Upper Ob basin (Kiryushin, 1995: 67).

It should be noted that features of the mound construction found at this site (traces of fire, pits, remains of meat, food, and eating utensils) occur in the Irmen Culture of the late Bronze Age, descendent to the Andronovo Culture in this region (Molodin, 1985: 131 – 136). This cultural succession is clearly demonstrated by quadrangular ditches in some kurgans at the Staryi Tartas-4 site. Similar constructions found at the sites of the Irmen Culture (Ibid.: 133; Molodin, Chikisheva, 1988: 132, 135, 146, 148) testify to the chronological and genetic affinity of the complexes of these cultures.

Burials

Totally, 25 burials were found at the Staryi Tartas-4 site of which 13 belong to adults*, 11 to children, and one to an adult and a child together (Fig. 4, 5). Three graves contained two child skeletons each.

In this necropolis, all adults were buried under earthen mounds, which is a typical feature of the burial rite of the Fedorovo sites in the Baraba Steppe (Molodin, 1985: 105) and the adjacent territories of the forest–steppe Ob River basin (Kiryushin, 1995: 59 – 61).

Under each mound there could be from one to three graves; eight kurgans (of nine total) that belonged to adults contained one grave. Kurgan 19 contained three graves located in the center of the kurgan. Only one grave in kurgan 19 was constructed in the northeast corner of ditch 1.

The burial pits are rectangular in shape with rounded corners. These earthen pits contained no traces of wood or stone constructions. The length of burial pits varies from 0.71 to 3 m, the width, from 0.5 to 2.7 m, and the height (from the original surface), from 0.44 to 1.47 m. The burial pits are usually oriented along the northeast – southwest line.

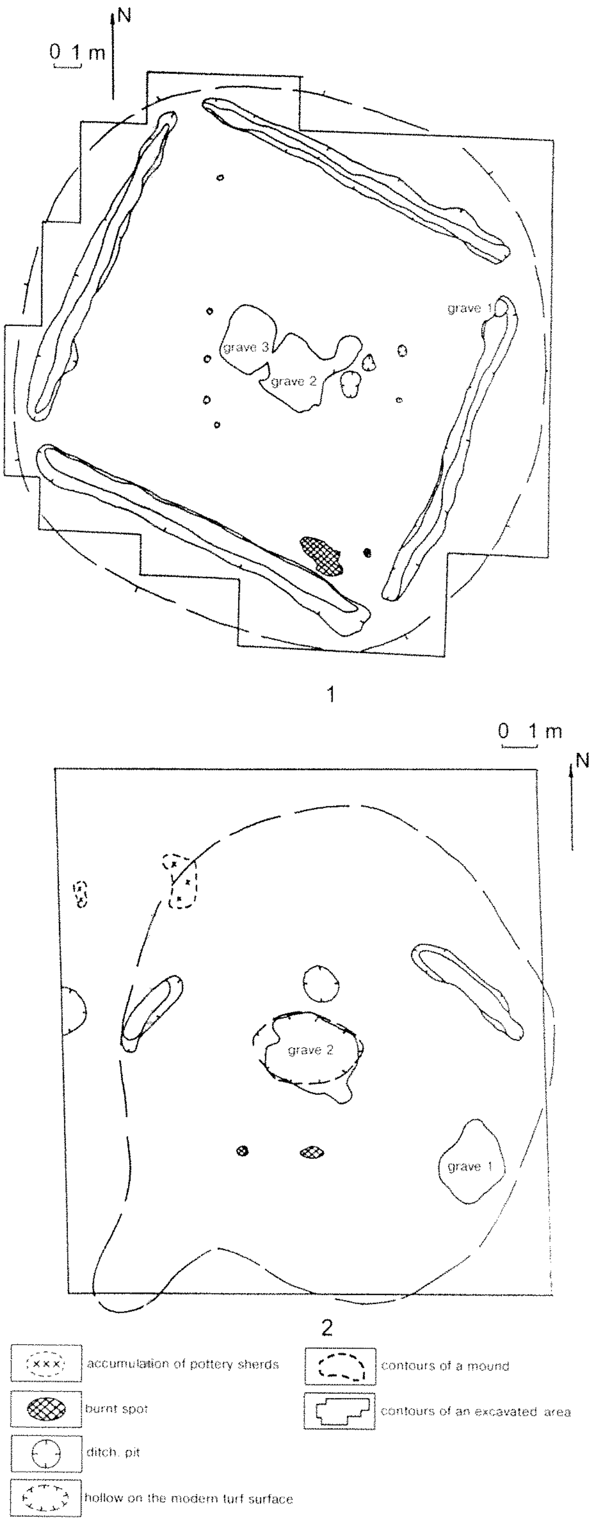
N
0 1 m
grave 1
grave 2
grave 3
1
0 1 m
N
grave 2
grave 1
2
accumulation of pottery sherds
contours of a mound
burnt spot
contours of an excavated area
ditch, pit
hollow on the modern turf surface

Fig. 3. Plans of kurgans 17 (*1*) and 19 (*2*).

Only one burial contained an inhumed skeleton. The bones were scattered, hence, we cannot reconstruct the position of the deceased in the pit. Other adult burials contained cremated human remains. Calcined bones – remains of cremation — were laid without any certain

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* We note that the term "adult burial" when referred to the rite of cremation is rather conventional because we are often unable to determine the age or even the number of cremated people.

General characteristics of the excavated

Kurgan N	Mound								Grave N	Grave length, m	Grave width, m	Grave depth (from the original surface), m	Ochre	Wooden roofing	Age	Inhumation
	Diameter, m	Height, m	Finds	Burnt spots	Pit	Animal bones	Ditch	Number of graves								
1	9	0 4	+	–	–	–	–	1	1	2	1 8	0 6	–	–	A	+
2	7.5	0 3	–	+	–	–	–	1	1	1 62	1 05	0 68	–	–	?	–
3	12 5	0 9	+	–	–	+	+	1	1	1 9	1 28	1 03	–	–	?	–
4	6	0 1	–	–	–	–	–	1	1	1 14	0 75	0 24	–	–	C	+
5	16	0 8	–	+	+	+	+	1	1	3	2 7	1 47	–	–	?	–
6	10	0 4	–	+	+	+	–	1	1	2 3	1 6	0 8	+	–	?	–
7	8 5	0 2	–	–	–	–	+	2	1 (1)	1 1	0 9	0 3	–	–	C	+
					–	–	–		1 (2)	1 1	0 9	0 3	–	–	C	+
					–	–	–		2 (1)	1 06	0 9	0 25	–	–	C	+
					–	–	–		2 (2)	1 06	0 9	0.25	–	–	C	+
8	11	0 58	–	+	–	–	–	1	1	2 53	1 59	0 66	–	–	?	–
9	14 5	0 57	–	+	+	–	–	1	1	2 5	1 6	0 92	+	–	C	+
10	12	0 58	+	+	–	+	–	1	1 (1)	3	1.7	1 1	–	–	C	+
							–		1 (2)	3	1 7	1 1	–	–	?	–
11	8	0 2	–	+	+	–	–	1	1	1 02	0 7	0 24	–	–	C	+
12	11	0 95	–	+	–	–	–	1	1	2 2	1 4	0 93	–	–	?	–
13	6	0 15	–	–	–	–	–	1	1	1 59	1 57	0 37	–	–	C	+
14	7 3	0 2	–	+	–	–	–	2	1	1 4	0 98	0 35	–	+	C	+
					–	–	–		2	1 4	0 93	0 5	–	–	C	+
15	12 75	0 4	–	+	–	–	–	1	1	2 21	1 31	0 95	–	–	?	–
16	15	0 55	+	+	+	–	–	1	1	2 12	1 74	0 65	–	–	?	–
17	14	0 6	+	+	–	–	–	2	1	2	1 6	0 48	–	–	C	+
						–	–		2	1 8	1 4	0 5	–	–	?	–
19	21 5	0 5	+	+	–	–	+	3	1	0 71	0 5	0 44	–	–	?	–
						+			2	2 05	1 2	0 56	–	–	?	–
						–			3	2 15	1 7	0 69	–	–	?	–
Total								23								

Note "A" – adult and "C" – child In "Grave N", the number of the burial is given in parentheses

order. In some burials, these bones were found in the filling of the grave pit; in two burials (kurgan 8, grave 1 and kurgan 12, grave 1), calcined bones were in the center of the grave pit. In grave 1 of kurgan 19, the calcined bones were in an urn. We believe that first the urns were deposited into the burial pit and then the bones of the deceased, which were hardly kept in some other container as evidenced by grave 1 of kurgan 15 and other burials, were put into the urns. The deceased were cremated not inside the burial, except for burial 1 of kurgan 16, where we recorded burnt pit walls evidencing the cremation inside the pit. Analogous features are reported from the Fedorovo sites of the Andronovo cultural entity (Molodin, 1985: 105 – 106; Kiryushin, 1995: 62; etc.).

A burial in a ditch (ditch 1 of kurgan 19) is of special interest because such burials have never been found at the other Andronovo (Fedorovo) sites of the Baraba Steppe. However, there are similar facts reported from Kazakhstan: in the southeast part of kurgan 7 at the Putilovskaya Zaimka-2 site (Northern Kazakhstan) outside a stone fence, a rectangular pit in a ditch contained an urn (near the northwest wall) and calcined bones in the center of the grave. At the Burluk I site (Northern Kazakhstan) within enclosure 9, a broken urn containing burials at the Staryi Tartas-4 site

Extended	Crouched	On the right side	On the left side	Orientation	Single burial	Pair burial	Collective burial	Head burial	Traces of cremation	Bronze needle	Bronze plate	Bronze ring	Knife-shaped plate	Bronze axe	Vessel	River shell	Astragal
–	?	?	?	?	+	–	–	–	–	–	1	1	–	–	2 (1)	–	–
–	–	–	–	–	?	?	?	–	+	–	–	–	–	–	1	–	–
–	–	–	–	–	?	?	?	–	+	–	–	–	–	–	2 (1)	–	–
–	+	–	+	NE	+	–	–	–	–	–	–	–	–	–	1	–	–
–	–	–	–	–	?	?	?	–	+	1	–	–	–	–	5 (?)	+	–
–	–	–	–	–	?	?	?	–	+	–	–	–	–	–	4	–	–
–	+	–	+	W	–	+	–	–	–	–	–	–	–	–	2	–	–
–	–	–	–	W	–	–	–	+	–	–	–	–	–	–	–	–	–
+	–	–	–	W	–	+	–	–	–	–	–	–	–	–	2	–	–
?	?	?	?	W	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	?	?	?	–	+	–	–	–	–	–	2	–	–
?	?	?	?	?	+	–	–	–	–	–	–	–	–	–	4 (?)	–	–
–	–	–	–	–	–	+	–	–	+	–	–	–	–	–	6 (?)	–	–
–	–	–	–	–	–	–	–	+	–	–	–	–	–	–	–	–	–
–	+	–	+	SW	+	–	–	–	–	–	–	–	–	–	1	–	–
–	–	–	–	?	?	?	?	–	+	–	–	2	–	–	2	–	–
–	+	–	+	W	+	–	–	–	–	–	–	–	–	–	1	–	–
–	+	+	–	?	+	–	–	–	–	–	–	–	–	–	1	–	22
–	+	–	+	SW	+	–	–	–	–	–	–	–	–	–	2	–	–
–	–	–	–	–	?	?	?	–	+	–	–	–	–	–	6	–	–
–	–	–	–	–	?	?	?	–	+	–	–	–	–	–	2	–	–
–	?	?	?	SW	+	–	–	–	–	–	–	–	–	1	1	–	–
–	–	–	–	–	?	?	?	–	+	–	–	–	–	–	4 (?)	–	–
–	–	–	–	–	?	?	?	–	+	–	–	–	1	–	1	–	–
–	–	–	–	–	?	?	?	–	+	–	–	–	–	–	–	–	–
–	–	–	–	–	?	?	?	–	+	–	–	–	–	–	10 (?)	–	–
										1	1	3	1	1	64 (?)		

calcined bones was found in a pit under stones (Zdanovich, 1988: 97, 105). Both of these sites were attributed to the Fedorovo Culture.

The Staryi Tartas-4 burial ground contained 11 child burials, which is 44% of the total number of burials. There are two types of the child burials: burial mounds (nine occurrences) and pit burials (two occurrences). Mound burials are of two types: (1) one mound covers two graves (kurgan 7 and kurgan 14) and (2) one mound has one grave in the center.

In most cases, infant burials were under detached mounds that were placed among mounds with adult burials. This trend is typical of the other Andronovo sites of the eastern area of this culture. After excavations of several Andronovo sites in the Upper Ob River basin, M.P. Gryaznov (1956: 22) proposed that the Andronovo population buried their children at special cemeteries. G.A. Maksimenkov supported his hypothesis (1978: 53). However, V.I. Matyushchenko argues that this regularity is atypical of the Andronovo sites (1973: 40). One of the authors of the present article conducted a special study of child burials at the fully excavated site of Preobrazhenka-3 and distinguished various traditions of child burials that existed in the Andronovo society,

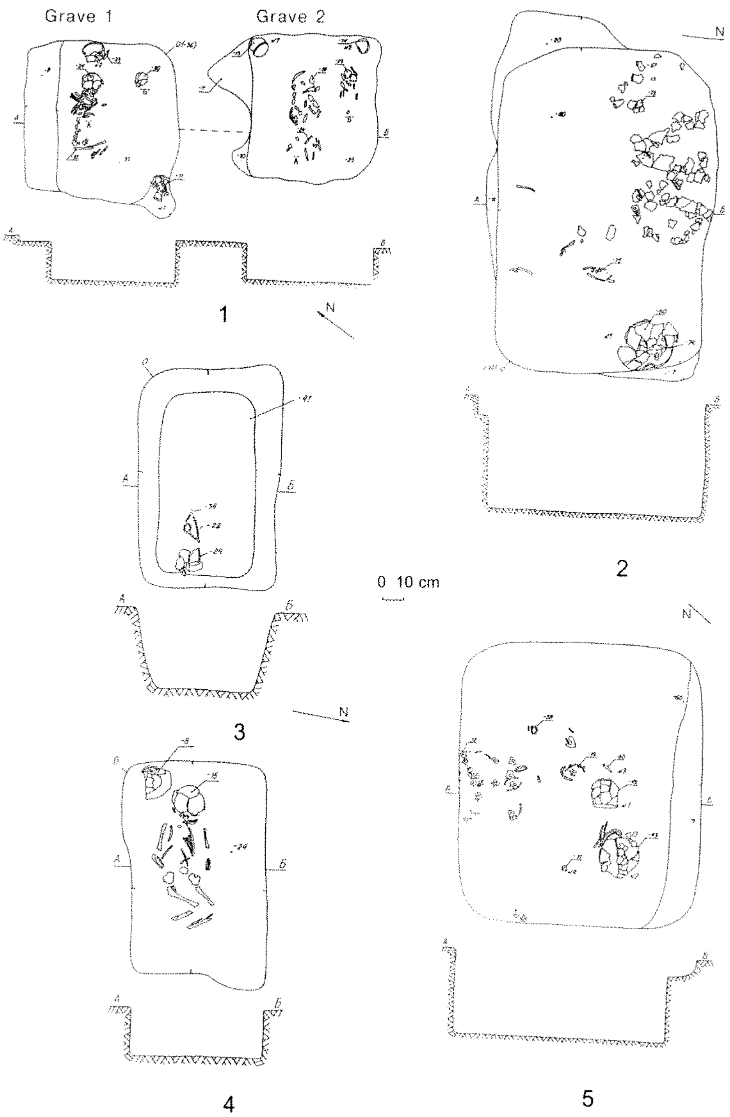


Fig. 4. Types of burials at Staryi Tartas-4.
1 – kurgan 7, graves 1 and 2; *2* – kurgan 6, grave 1; *3* – pit grave 1; *4* – kurgan 4, grave 1; *5* – kurgan 1, grave 1.

including special child cemeteries with pit graves (Molodin, 1984: 37 – 44). A combination of different traditions was also found at the site analyzed. Inhumed children were buried crouched on their left sides with their heads in most cases pointing to the southwest and less often to the west and east–northeast. A similar orientation is common for other Fedorovo sites of the Baraba Steppe (Molodin, 1985: 110). We found a burial with burnt spots on walls, which evidence the use of fire in the burial rite. In the center of the grave there was a calcined child skull and several disordered bones of its skeleton. Two other graves contained only skulls of dead children.

The graves (graves 1 and 2 of kurgan 7) contained paired and single burials. Paired burials of children were reported from the Andronovo sites in the Minusinsk Basin (Maksimenkov, 1978: 28, 34).

We found two paired burials of an adult and a child: one was a burial of an adult and a child under the same mound (graves 1 and 2 of kurgan 17) and the other was a combined burial of a cremated adult and a child's skull (kurgan 10). Burials similar to the latter were found in grave 2 of kurgan 12 at the Preobrazhenka-3 burial ground, where a crouched child skeleton buried in a rectangular pit oriented along the southwest–northeast line neighbored a cremated adult (presumably) whose calcined bones were laid between child legs (Molodin, Sobolev, 1975: 14). M.D. Khlobystina attributed burials of this kind to a specific version of the burial rite, the "biritual" burial (1976: 8 – 15). Acknowledging the existence of the "biritual" version, we note that this term can be applied only to a collective burial of an inhumed child with a cremated adult. If both individuals were inhumed, this would suggest the use of only one burial rite and not two different rites; therefore, the use of the term "biritual" would be incorrect in this case (Molodin, 1985: 109). Generally, we conclude that the Staryi Tartas-4 site has much in common with the Fedorovo sites located in the Baraba steppe (Ibid.: 104 – 113) and the entire area of this culture.

Let us note special planigraphic features of kurgans 16, 17, and 19 located in the peripheral section of the site. From other kurgans, they differ in their location, a larger distance between them, size, grave goods, and construction elements (pits–ditches, a ritual pit, and a group of pits near grave 20). These variations cannot be explained by either chronological or cultural differences between the central and peripheral kurgans because both types of kurgans contain cremated burials and Fedorovo-type ceramics. Obviously, these peripheral kurgans have a specific construction because they contain burials of people distinguished in the Fedorovo society for some reasons (social status, property status, sex, or age?). Similar sites are reported from Central Kazakhstan (Margulan, Akishev, Kadyrbaev, Orazbaev, 1966: 66).

Grave goods

The most abundant category of grave goods found at this site as well as at other sites of this culture is ceramics. In general, the forms and ornamentation of the ceramic complex of this site, being quite typical of the Andronovo Culture, show some original features.

Ceramic vessels

Totally, 64 vessels were found at the burial ground (most of them were found in graves and mound fillings) (Fig. 6 – 9). In this collection, 38 vessels are archeologically complete, 26 specimens are represented in fragments (15 of them were completely reconstructed in graphic), and 11 vessels can be only partly reconstructed.

Current methods for analyzing ornamentation of the Andronovo ceramics (see, e.g., (Zotova, 1965: 177 – 181; Mikhailov, 1990: 9; Kovtun, Mikhailov, 1998: 253 – 257)), focused on studying representative collections from various sites, allow us to reliably distinguish types and local variants in an aggregate of the Andronovo ceramics on the basis of specific features of ornamentation. However, a detailed analysis of a collection from an individual site is undoubtedly of great scientific importance.

Generally, the ceramics collected at the site is typical of the Fedorovo sites located in the Baraba steppe and the other areas of this culture. Most vessels belong to classical sets of the Andronovo ceramics (percentage composition takes into account only archaeologically complete and graphically reconstructed vessels, totally, 53 specimens): vessels with a smooth profile and rich decoration – 39 specimens (73.6%), simple jar-shaped vessels – 10 specimens (18.9%), and vessels of a transitional form (jar-shaped vessels with slightly everted rims) – 4 specimens (7.5% of the total number).

In addition to the classical Andronovo pottery, we found rare specimens:

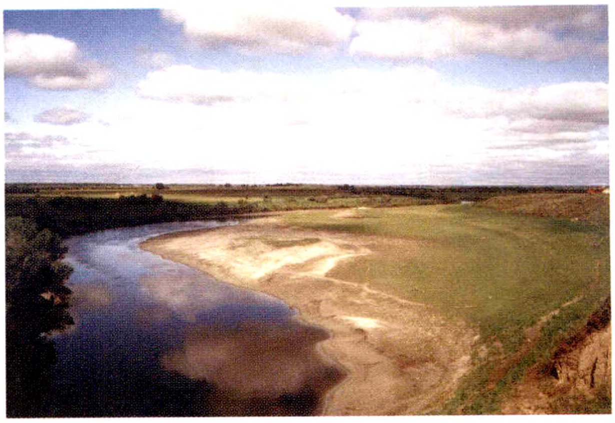
– two vessels with almost rectangular mouths from kurgans 16 and 19 (see Fig. 8, *15*; 9, *7*);

– two pots with rolls: a pot with an attached roll from kurgan 6 (the pot was found in assemblage with other vessels) (see Fig. 7, *4*) and a vessel with a roll formed of a vessel's body (this pot was the only in the burial) (see Fig. 6, *8*).

– an Alakulevo-type vessel with a rib between the neck and the body and two prominent ribs on the neck was found in kurgan 16 together with the Fedorovo vessel with a rectangular mouth (see Fig. 8, *16*). Close analogues to this vessel (with one rib on the neck) were found, for example, at the burial grounds of Semipalatnoe (kurgan 6, vessel 5; kurgan 2, vessels 15 and 23) and Aksaiman (kurgans 9 and 10) (Zdanovich, 1988: 85, 104, 108).

In the collection from the Staryi Tartas-4 burial site, a technological analysis revealed at least three pairs of vessels that were produced by one craftsman. Such pairs were found in kurgan 6, grave 1 (see Fig. 7, *1, 2*); kurgan 7, grave 2 (see Fig. 7, *7, 8*); and kurgan 10, grave 1 (see Fig. 8, *2, 5*). Impressions on these vessels were obviously made with the same tool, which was traced because of several defected teeth an d identical sizes between tooth impressions. In addition, these vessels are similar in profile, paste composition, and wall thickness. Two vessels from kurgan 6 are decorated with absolutely identical ornamental patterns (see Fig. 7, *1, 2*). We are not aware of any other examples of two vessels found in one burial that had identical complex ornamental patterns consisting of three parts.

Generally, the pottery types found in the kurgans correlate well with the planigraphic features of the entire burial ground noted above.



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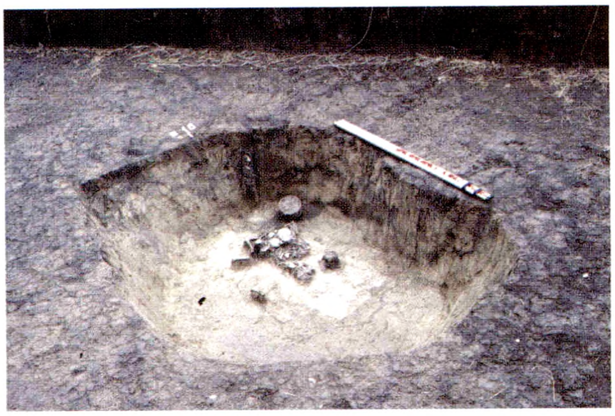

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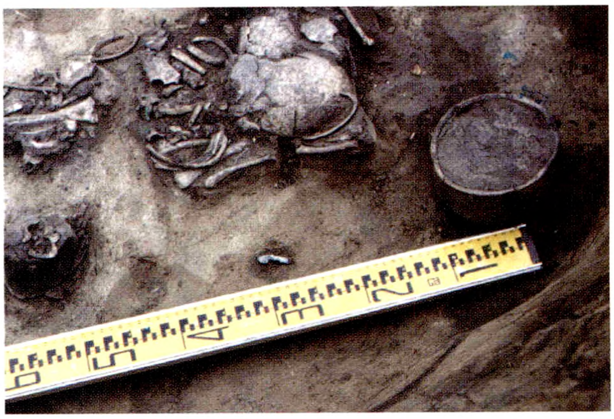

3

Fig. 5. Baraba forest-steppe, a view of the Om River near the Staryi Tartas-4 burial ground (*1*); general view (*2*) and fragment of kurgan 16, grave 1 (*3*).

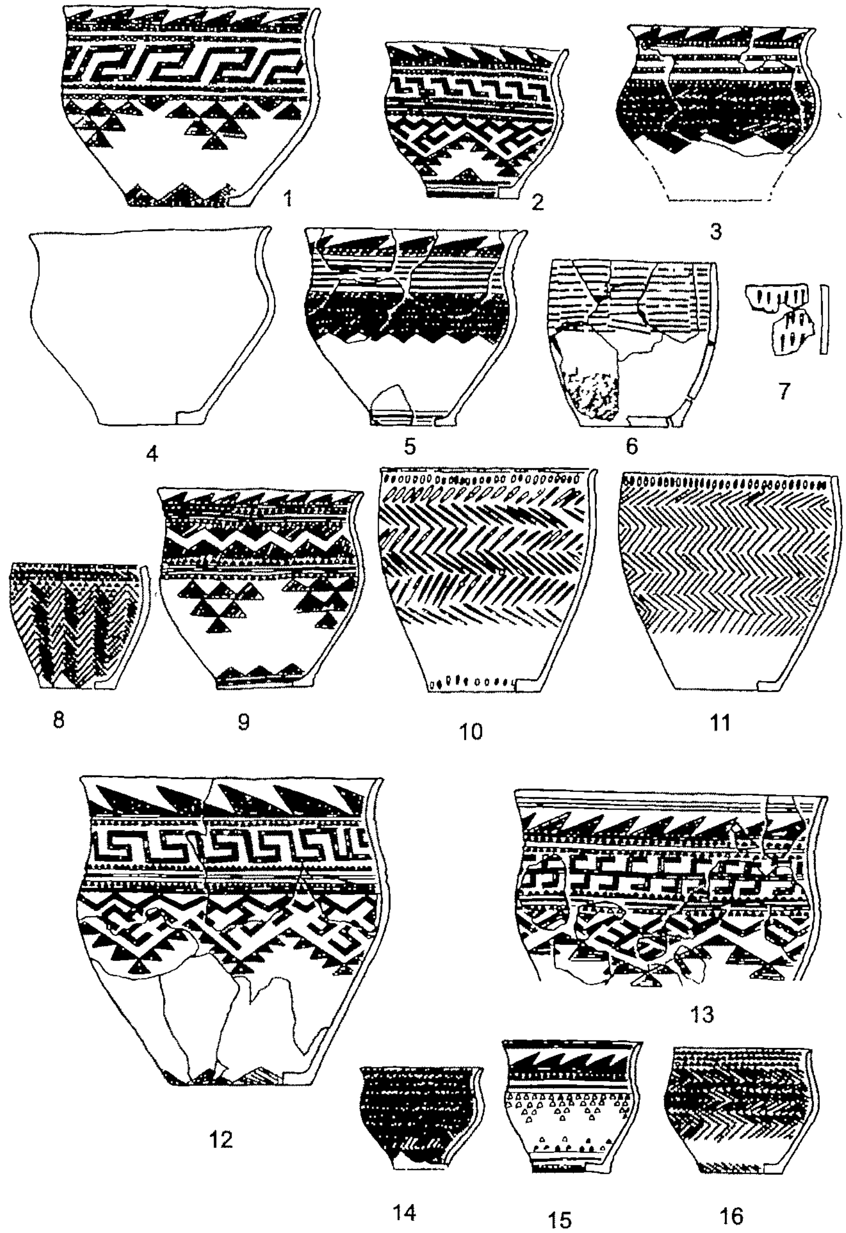

Fig. 6. Ceramics from Staryi Tartas-4
1, 2 – kurgan 1, grave 1, *3* – kurgan 1, mound; *4* – kurgan 2, grave 1, *5* – kurgan 3, mound,
6, 7 – kurgan 3, grave 1, *8* – kurgan 4, grave 1, *9 – 13* – kurgan 5, grave 1, *14* – kurgan 13, grave 1, *15* – pit grave 1, *16* – kurgan 11, grave 1

Two (N 5 and 10) of three large mounds on the right side of the central group contain a typologically identical set of pottery — three pots with prominent profiles with a complex "carpet" patterns and two pots with a simple herringbone pattern (see Fig. 6, *9 – 13*; 8, *1 – 5*). All the three large kurgans of this group contain one pot with a "carpet" pattern and a band of impressions above the triangles decorating the rim (see Fig. 6, *13*; 7, *14*; 8, *4*). The significance of this ornamental pattern in the set of the decoration techniques of the Staryi Tartas-4 ceramics increases if we take into account a pot from grave pit 1 (see Fig. 6, *15*). This seemingly insignificant detail actually plays an important role. as a rule, densely ornamented vessels with a band of triangles and a decoration field consisting of three sections originating from the eastern province of the Andronovo cultural community rarely have an additional band. Among Andronovo classical vessels with a "carpet" pattern, this band of impressions above the triangles decorating the rim was found only on a few vessels (Orak, grave 28; Borovoe, enclosure 10, grave 2; Vakhrushevo, kurgan 3; etc.) (Komarova, 1961: 71, plate XIII, *3*; Orazbaev, 1958: plate II; Troitskaya, 1969: 5, fig.

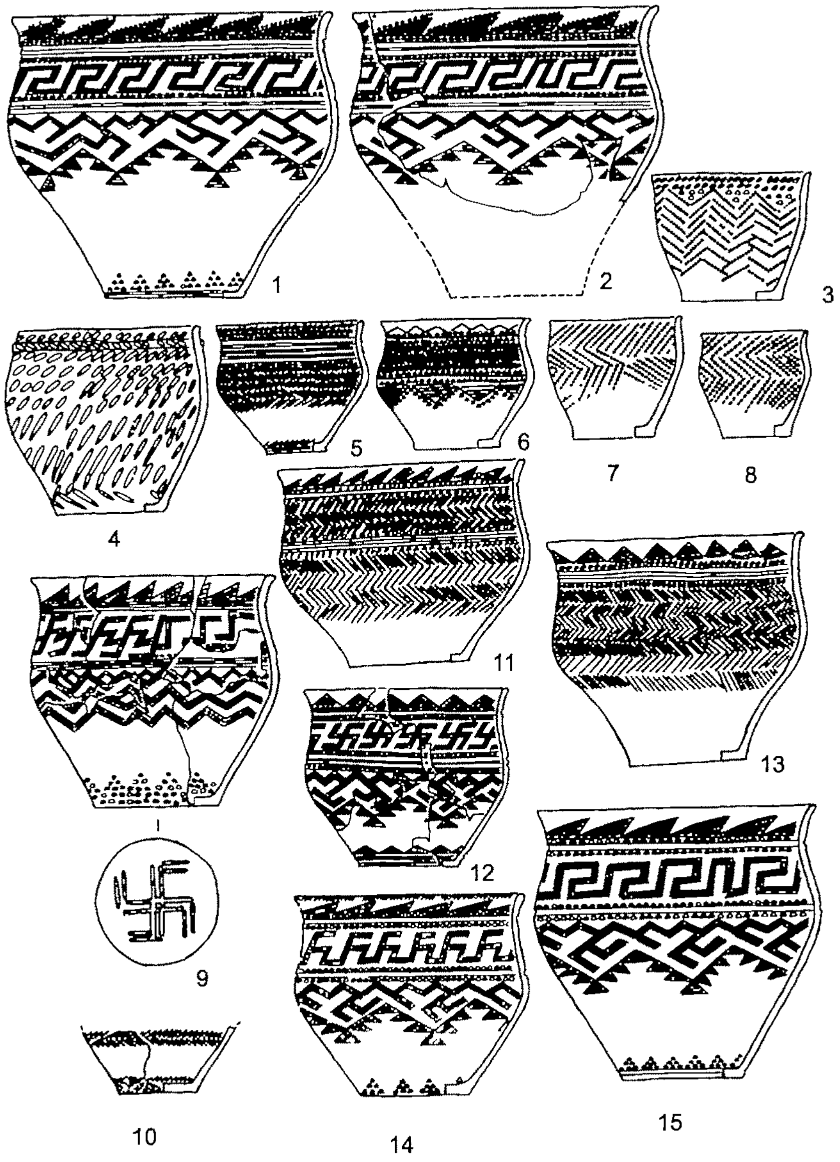

Fig. 7. Ceramics from Staryi Tartas-4.
1 – 4 – kurgan 6, grave 1; *5, 6* – kurgan 7, grave 1, *7, 8* – kurgan 7, grave 2, *9, 10* – kurgan 8, grave 1,
11 – 13 – kurgan 9, grave 1, *14, 15* – kurgan 12, grave 1

1, *a*). We note that a band of impressions above the triangles decorating the rim is a typical ornamental tradition of the Fedorovo Culture of the Urals and Kazakhstan (sites of Solntse-Talika, Urefty, Fedorovka, and Putilovskaya Zaimka-2) (Vinogradov, Kostyukov, Markov, 1996: 136, fig. 3; 141, fig. 6; Stefanov, Dneprov, Korochkova, 1983: 157, fig. 2, *9*; Salnikov, 1940: 63, plate I, *8*; Zdanovich, 1988: 97, fig. 39, *2*, *6*). The Putilovskaya Zaimka-2 burial ground yielded both classical Andronovo vessels and vessels with imperfections of the ornamental pattern, which are typical of the Fedorovo tradition.

The western section of the burial site yielded a specific set of pottery: two vessels with rectangular mouths and one vessel with a rib similar to the Alakulevo tradition (see Fig. 8, *15*, *16*; 9, *7*). We note that the vessel with a rectangular mouth from kurgan 16 is of red color, and the other vessels are of brown-gray color. A similar situation was reported from the Vakhrushevo burial site: a vessel with a rectangular mouth was red and the others were brown-gray (Troitskaya, 1969: 12). Probably, a special type of clay paste and different firing regimes were used in the production of the vessels of specific shape.

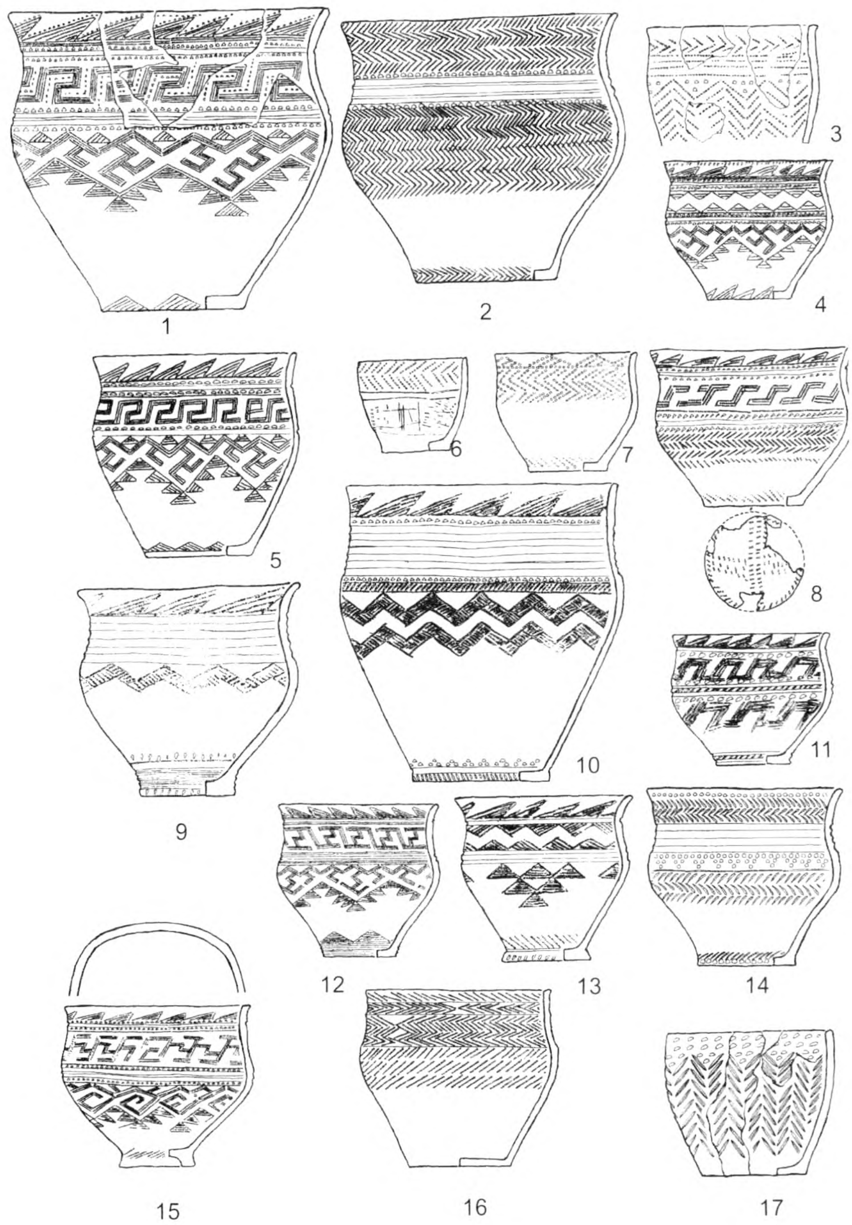

Fig. 8. Ceramics from Staryi Tartas-4.
1 – 5 – kurgan 10, grave 1; *6, 7* – kurgan 14, grave 2; *8* – kurgan 14, grave 1; *9 – 14* – kurgan 15, grave 1; *15, 16* – kurgan 16, grave 1; *17* – pit grave 2.

Frequent repetitions of the "carpet" pattern are a distinctive feature of this burial site. The Staryi Tartas-4 ceramic complex includes 13 vessels with the "carpet" pattern of which seven specimens have identical ornament, the so-called three-branched swastika (i.e., a swastika with only three branches, and variants of combination of such swastikas into a single chain might vary). Thus, vessels from kurgans 1 (see Fig. 6, *2*), 6 (see Fig. 7, *1*, *2*), 9 (see Fig. 7, *12*), 10 (see Fig. 8, *4*), and 12 (see Fig. 7, *14*, *15*) have a "carpet" pattern with the main structural element called a "pressed-in" three-branched swastika, whose third branch merges with the basic zigzag running around the neck of the vessel. A vessel from kurgan 10 is ornamented with a similar three-branched swastika but not "pressed-in": its third branch is fully depicted (see Fig. 8, *5*). A vessel from kurgan 15 has the same basic element turned upside down: it is connected with the basic zigzag by a half of the branch (see Fig. 8, *12*). A straight full three-branched swastika is depicted on two other vessels that have the "carpet" pattern consisting of various elements (kurgans 5 and 10) (see Fig. 6, *12*; 8, *1*). Vessels on which this pattern is the

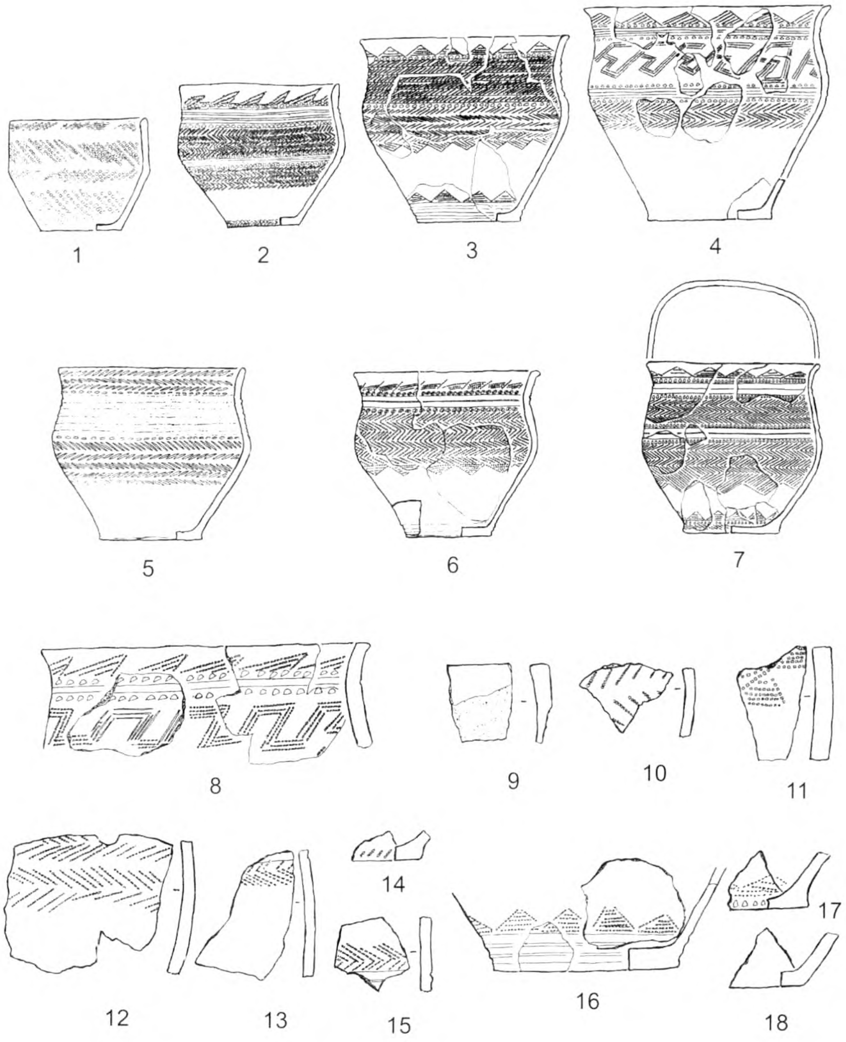

Fig. 9. Ceramics from Staryi Tartas-4.
1 – kurgan 17, grave 1; *2 – 4* – kurgan 17, grave 2; *5* – kurgan 19, grave 1; *6 – 18* – kurgan 19, graves 2 and 3.

main element ("pressed-in" three-branched swastika) comprise 53.8% (7 of 13 vessels). We cannot distinguish any other frequently seen element in the complexes with the "carpet" patterns. Motifs constructed of a repeated three-branched swastika are rare on the Andronovo vessels. Thus, only four of thirty pots with the "carpet" pattern on the shoulders found at the Andronovo burial sites in the Kuznetsk depression have the ornamental pattern studied. Three such vessels were reported from the burial sites of Titovo (kurgan 5, graves 1 and 6; kurgan 6, grave 5) and one more from the Tanai burial ground* (kurgan 10, grave 4). This pattern obviously dominating in this complex is classified as a complex one. This is an undoubtedly unique fact that one complex ornamental motif is represented so often within a ceramic collection from one archaeological site. Other Andronovo burial grounds with so frequently repeated "carpet" patterns of the same type are still unknown. We note that vessels with a three-branched swastika were found only in the central group of the burial ground; they have not been found in the kurgans of the western section.

The data from the Staryi Tartas-4 site give new information for correlation analysis of ornamentation principles and the sex of the deceased. A grave in kurgan 12 contained two piles of calcined bones, each of them had a vessel nearby. Near the northern pile there was a pair of hollow bronze earrings, which could belong only to a woman according to the Andronovo tradition. Therefore, it is quite logical to assume that the northern pile is the female remains, and the southern pile is the male remains. This conclusion is in accordance with the Andronovo tradition to bury together deceased of different

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* Bobrov V.V, Mikhailov Yu.I. Andronovskie pamyatniki Ob-Chulymskogo mezhdurechiya. Moscow, 1984. Deposited at VINION, 26.06.89, N 38518.

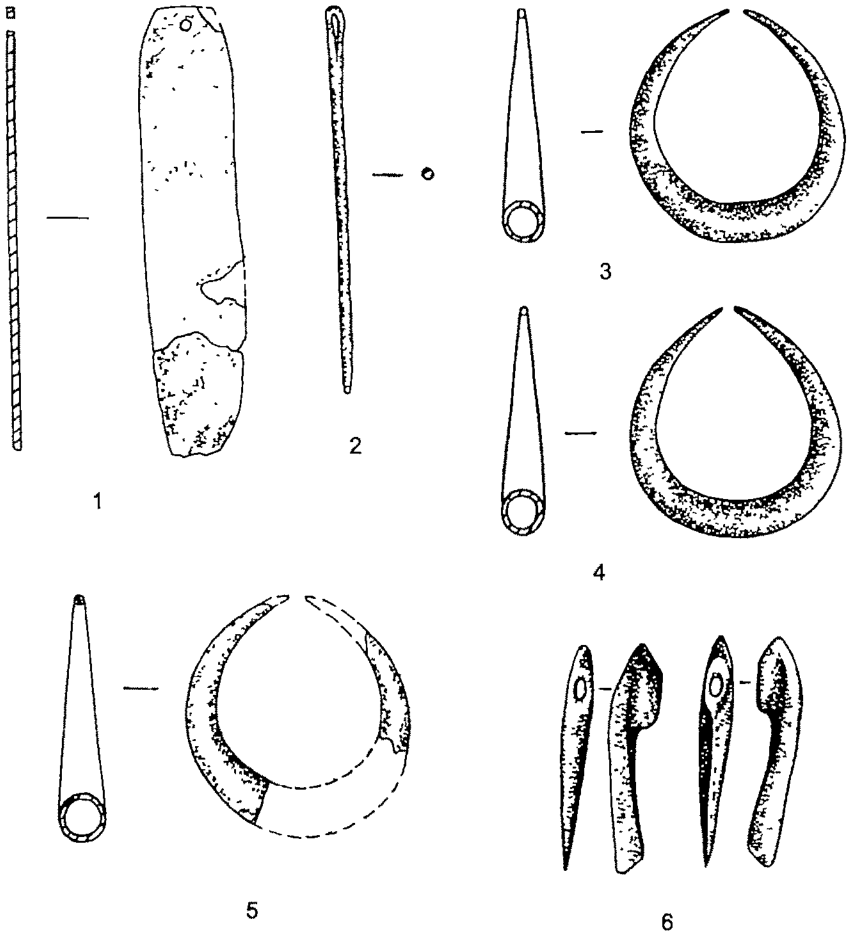

Fig. 10. Bronze articles from Staryi Tartas-4.
1 – plate (kurgan 1, grave 1); *2* – needle (kurgan 5), *3* – *5* – temple rings (*3* – kurgan 1, grave 1, *4*, *5* – kurgan 12, grave 1), *6* – axe model (kurgan 17)

sexes in accordance with the inhumation rite. We note that the vessels accompanying these people have an ornament of similar complexity.

Let us consider the problem of the correlation between the morphological features of the vessels and the age of the deceased. Following the age distinction, the ceramic sets can also be divided into two groups: vessels belonging to children and adults. Identification of child burials is doubtless because children were inhumed and not cremated, and their grave pits are smaller in size. Adult burials are distinguished rather conventionally on the basis of indirect evidence: the size of grave pits, the character of grave goods, and preserved fragments of bones of adult people.

The ceramics from child graves (kurgan 4 (see Fig. 6, *8*), kurgan 7, graves 1 and 2 (see Fig. 7, *5* – *8*), kurgan 11 (see Fig. 6, *16*), kurgan 13 (see Fig. 6, *14*), kurgan 14, graves 1 and 2 (see Fig. 8, *6* – *8*), kurgan 17, grave 1 (see Fig. 9, *1*); pit graves 1 and 2 (see Fig. 6, *15*; 8, *17*)) and from adult burials have different parameters: the number of vessels, their sizes, forms, and ornamentation. An exception is a grave from kurgan 9, in which the child remains are accompanied by a set of three pots that are typical of adult burials (see Fig. 7, *11* – *13*). We excluded from the analyzed sample a pot from grave 1 of kurgan 19 (see Fig. 9, *5*) because of the uniqueness of this burial. The burial had extremely small dimensions (the pit was dug specially for the vessel size), and the pot contained traces of a cremated corpse It is impossible to identify the age of the cremated individual. Because two central burials in kurgan 19 and a central grave in kurgan 12 were seriously destroyed, we failed to establish the number of vessels inside them.

Generally, the ceramic set from child burials is more homogeneous than a set from adult graves. "Child" vessels are mainly jars or vessels of a transitional form with a simple herringbone pattern. From this array, we might distinguish a vessel from grave 1 of kurgan 14 (see Fig. 8, *8*). It is of large size (diameter 20 cm, height 15 cm) and has a classical pot-shaped profile, a three-zone ornament, and an ornamented bottom. We also note a vessel from child pit grave 1 with a profile typical of a pot and a thorough two-zone ornament (see Fig. 6, *15*).

Vessels from the adult burials cannot be given a uniform description. One burial can contain from one to six vessels of various shapes (classical pots, typical jars, pots with a rectangular mouth, and the Alakulevo-type vessels with ribs). We also note that pots are a dominating type in this collection (there are 31 pots and 7 jars among the completely preserved vessels). Pots are finely decorated with a full spectrum of patterns that existed in the Andronovo Culture. The vessels from the adult burials vary greatly in size.

Bronze articles

A bronze model of an axe found in kurgan 17 is a special item in the collection of bronze articles (Fig. 10, *6*). It is a reduced copy of an axe with a large head. Its direct analogue is an axe from the Zmeinogorsk mine (Avanesova, 1991: fig. 13, *53*). The blade length is 4 cm and the head width is 1 cm. According to the classification by E.N Chernykh (1970: 58), this axe is attributed to large-head axes; a variation of this type is an axe with a crest. M.P. Gryaznov noted that the Andronovo people had such axes (1956: 21). An axe of a similar shape was found near the village of Lyapino and attributed to the large-head axes of the Kazakhstan type. Axes with large heads were also typical of the Srubnaya Culture. G.B Akhmerov suggests their use as mining implements, such as hammers or picks (1955: 81). E.E. Kuzmina believes that this type of axe was spread in the western periphery of the Andronovo Culture, the Cis-Ural region, and the sites of the Srubnaya Culture and dates them as far back as the third quarter of the 2nd millennium BC (1966: 11).

A bronze needle produced of wire with a round cross-section (Fig. 10, *2*) was found broken in kurgan 5 A similar specimen was found at the Abramovo-4 site in the Baraba Steppe (Molodin, 1985: 104). A needle with an eye from Abramovo-4 was also produced of thin wire. A similar needle was reported from the Elovskii burial ground in the Upper Ob River basin (EK-2) (Matyushchenko, 1973: 12).

Three temporal bronze rings with disconnected ends were found at the site (Fig. 10, *3 – 5*): one ring in kurgan 1, grave 1 and two rings in kurgan 12, grave 1 These decorations are often found at the sites of the Andronovo community (Avanesova, 1991. fig 45, *27 – 44*; 46, *11 – 45*, *49 – 71*).

A bronze plate–covering (Fig. 10, *1*) was found in kurgan 1, grave 1.

Other finds

An accumulation of 22 astragali from kurgan 14, grave 2 is of interest because for the Baraba region, astragali are rather atypical though they are reported from the Preobrazhenka-3 site (Molodin, 1985: 104). However, astragali are often found in the Andronovo burials in the Upper Ob River basin (Matyushchenko, 1973: 24).

In the mound of kurgan 16, we found river shells, which were widely used as decorations by the Andronovo population (Ibid.; Molodin, 1984: 104).

Conclusion

The burial ground of Staryi Tartas undoubtedly belongs to the eastern area of the Andronovo cultural–historical entity. However, this is an original and unique site because it shows some specific features, such as an interesting spatial arrangement of kurgans, an unusual construction of grave pits, original morphology and ornamental techniques of the ceramic complex. The probable reasons for such diversity are special ethnic or social statuses of the deceased rather than a chronological gap between the kurgans. Specific features of the burial rite (ditches) that have close parallels at the sites of the Irmen Culture of the late Bronze Age evidence that the burial ground studied belongs to a final stage of the Andronovo Culture in this region and support the idea of a successive development of the Irmen Culture from the antecedent Andronovo community.

The data from the Staryi Tartas-4 burial ground extend the number of sources available for studying the semantics of the Andronovo Culture. Additional arguments in favor of the coexistence of vessels with rolls with the classical types of the Andronovo vessels were obtained. An interesting result is the coexistence of the classical Andronovo ceramics of the Fedorovo type with the Alakulevo forms. The "carpet" pattern dominates in the decoration of the vessels. We revealed specific features of ornamentation of this ceramic complex and obtained new data, which allow us to correlate the types of vessels with the sex of the deceased.

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ANCIENT ALTAIAN MIRRORS

Introduction

Although bronze mirrors from the barrows (*kurgans*) of ancient Central Asian nomads have been published in special articles and in the context of more general monographs, they still have been studied insufficiently in comparison with other categories of artifacts. As a rule, scholars pay little attention to the analysis of artistic and stylistic features of images that can be seen on the reverse sides of mirror disks. From the viewpoint of semantics, a common zoomorphic design of mirror handles is of special interest. One of the possible reasons for the lack of attention from archaeologists to these finds as a valuable source of information on the history of ancient art is that there is a great number of inexpressive mirrors with short loop or arc handles and plain disks. However, it might also be possible that many ancient nomadic mirrors deposited at museum reserves have engravings yet unrevealed. This happens because archaeologists have a firm tradition of storing and even exhibiting metallic rarities that have not been restored, i.e., still covered with bronze oxides. In the Altaian collection, restoration helped to discover a series of bronze mirrors with fine engravings. "Decryption" or "decoding" of pictures and decorative elements gives us additional valuable information on the astral cult, magic, and mythology. In some cases, these pictures could aid in more precisely dating the production of a mirror and the construction of the burial complex where it was found.

Mirrors with engravings on the reverse sides are rarely found in the burials of ancient nomads, and their summary is undoubtedly of great practical importance to Siberian archaeology.

Distribution, typology, and chronology

Mirrors are the most numerous artifacts among other ritual objects found in the kurgans of ancient Altaian nomads. The collection of mirrors from the kurgans in the Chuya Hollow alone, excavated by the author, comprises more than 100 items. According to our classification, this collection includes eight types of mirrors (Kubarev, 1987a: 90 – 91, fig. 34). The most numerous mirrors of types 2 and 3, which are called in the literature "medal-shaped mirrors," are often found in the archaeological sites of Central Asia. They have been reported from the 5th – 2nd century BC burial complexes in the Trans-Baikal Region, Mongolia, Ordos, and Kazakhstan (Rudenko, 1962; Maksimova, 1976; Kubarev, 1996). Because the mirrors of this type were widely spread in the regions indicated, there are serious reasons to assume their local, Central Asian origin. In the 3rd – 1st centuries BC, a period of close cultural contacts with the peoples of the Sayano-Altai region, these mirrors appear to become known to the Tagar tribes and the nomads of neighboring Tuva (Martynov, 1979: plate 16; Vadetskaya, 1986: 52; Kurochkin, 1988: fig. 15, *11*, *12*; Mandelshtam, 1992: plate 76, *12*, *19*, *29*). In addition, thin mirror-plaques with small arched loops in the disk centers (type 7 according to our classification) found in the kurgans of Yustyd and Ulandryk were introduced into the Altai and Tuva by the Tagar tribes. These "arched" mirrors are typical of the Tagar Culture of the Minusinsk Basin, where more than 300 mirrors of this type were found (Kiselev, 1951: 229; Martynov, 1979: plate 15; etc.). They were in use for the entire Tagar period and in the transitional Tagar–Tashtyk time (500 – 100 BC). Similar "arched" mirrors were found in the Altai for the first time (Kubarev, 1987a: fig. 34,

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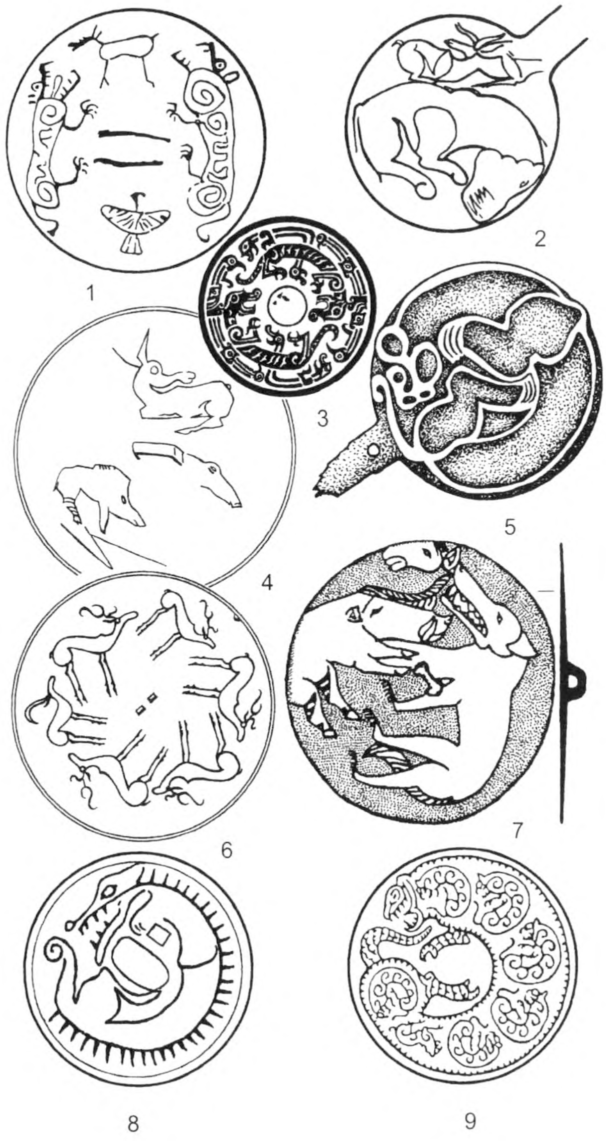

Fig. 1. Mirrors of the Early Scythian period.
1, 3 – Shantsunlin (China); *2* – Uigarak (Kazakhstan); *4* – Zhilandy (Kazakhstan); *5* – Izmailovka (Eastern Kazakhstan); *6* – Altai (from P.K. Frolov's collection); *7* – Tuva (after (Bokovenko, 1994)); *8, 9* – Xinjiang (after (Komissarov, 2000; Varenov, 2000)).

10; 1991: fig. 25, *16*; 1992: fig. 36, *16*), except for mirrors with "rims" that are close in construction but more massive and ancient (800 – 600 BC) found in the Early Scythian kurgans (Fig. 1, *1, 3, 4, 6, 8*) or even more archaic mirrors of the Andronovo Culture (Gryaznov, 1947; 1956).

All Central Asian mirrors, including those from the Altai, can be divided into three main groups based on size: (1) large (diameter 7 – 12 cm), (2) reduced or small (diameter 4.5 – 6 cm), and (3) miniature (2.5 – 4 cm). The most archaic large mirrors (see Fig. 1) are dated between the 7th and 6th centuries BC, small mirrors (Fig. 2 – 9), the most numerous, are dated between the 5th – 3rd centuries BC, and miniature mirror–pendants are the latest (the 2nd – 1st centuries BC). Two rare mirrors (Fig. 10) from the Altai are attributed to the late medieval and early ethnographic times.

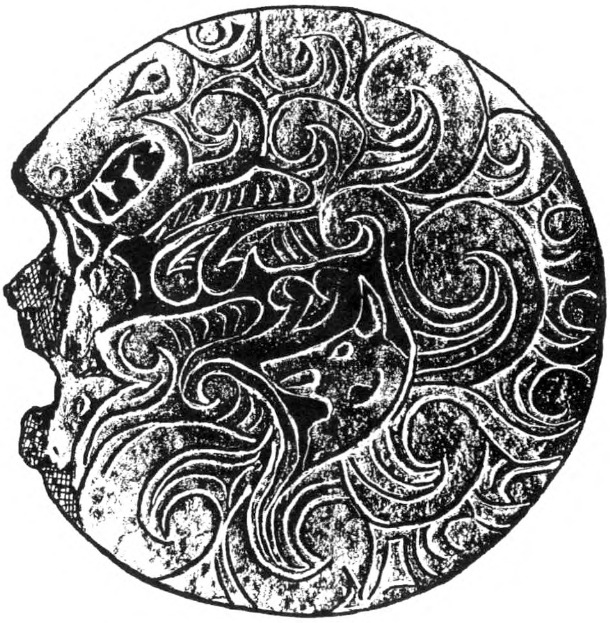

Fig. 2. Mirror from a burial on the Yustyd River, the Altai.

Engravings are found on the reverse sides of mirrors of types 1 and 2. Engravings on mirrors with a "rim" and a loop central knob are not so numerous (see Fig. 1, *1, 3, 4, 6, 7 – 9*). Most often, engravings are seen on medal-shaped mirrors with short side handles (see Fig. 3, *1 – 3, 4, 6*; 4, *3, 6, 8*; 7, *1, 6*; 9, *3, 4*), which can be designed as animal or bird bodies or heads (see Fig. 4, *4*; 5; 6; 7, *2 – 5*; 8). Some fragments of handles and ragged mirror sides suggest that other mirrors also had side handles (see Fig. 2; 3, *5*; 4, *5, 7*; 9, *2, 5*). Specimens with long handles (see Fig. 1, *2, 5*; 11) were found in the kurgans located to the west of the Altai. Most of these mirrors are imported goods. The regularity revealed (engravings on early Scythian mirrors with rims and on mirrors with side handles) shortens the time when these mirrors were in use and thereby aids in analyzing pictures on these mirrors.

Motifs and images on mirrors

Various authors in their studies devoted to ancient mirrors consider them from different views: with a handle up or with a handle down. As a result, images on the reverse sides of mirror disks are treated differently, which in some cases leads to false conclusions. For example, D. Navan believes that figures on the Ulangom mirrors (Mongolia) are depicted upside down. This could mean that the animals

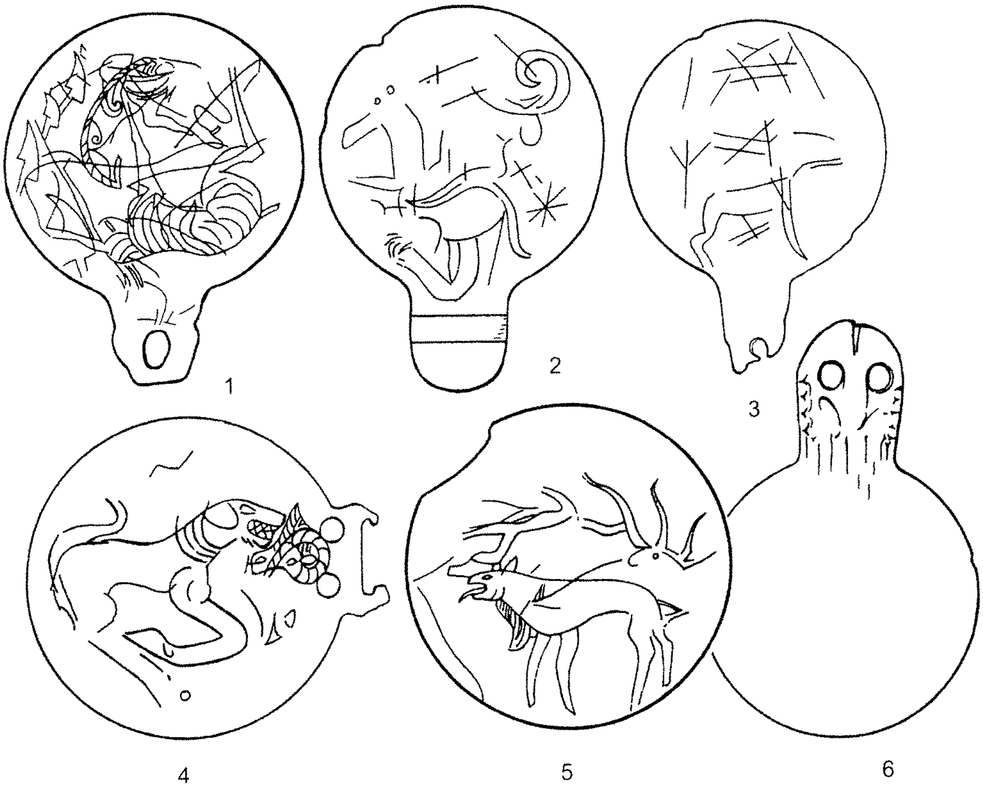

Fig. 3. Mirrors of the Pazyryk and Saglyn cultures of the Altai and Tuva.
1 – Borotal; *2, 3* – Yustyd; *4, 6* – Mazhalyk-Khovuzu; *5* – Sagly-Bazhi.

are dead or this is a sign of the death of the mirror's owner (Navan, 1978: 121). The author could not draw this false conclusion on the semantics of the mirror if he saw the picture on the mirror with its handle down, i.e., in the only right position that is also functionally justified. Therefore, we must agree with T.M. Kuznetsova (1987: 23) that conditionally, we are to describe a mirror with its handle turned down because female deities holds mirrors in this position on golden plaques from the Scythian kurgans of Kul-Oba, Chertomlyk, Oguz, Nosaki, etc.

In the Altaian series of mirrors from kurgans of ancient nomads, one mirror from a burial on the Yustyd River is special (see Fig. 2). There is an image of a feline on its reverse side. On the whole, this picture is almost an ornament because there are many volutes, probably showing fur, and it is very hard to see a highly stylized figure of a coiled feline. The head and the backside of the feline are very close to each other, and his front and hind legs with soft pads are joined together. Between the stomach and the hind leg, a miniature head of some herbivorous animal (roe deer or deer?) is skillfully engraved. Another miniature animal head stylistically similar to the previous one is depicted in front of bared predator's teeth. At last, a contour of the head of the third animal, probably a wild boar (?), forms the lines of the thigh and the hind leg of the largest feline. Probably, the body and legs of the last animal stretched to the mirror handle that has been lost. If one looks at the picture most attentively, he can distinguish several wings among large volutes symmetrically places on the animal body. Their form and parallel shading inside the contour suggest that these are wings and not ornamental elements. Wings on bird-like golden plaques, realistic wooden figurines of eagles and swans that decorated headdresses of ancient nomads buried in the kurgans of Yustyd and Ulandryk are made in a similar manner. Fantastic predators from the Pazyryk have wings of the same form (Rudenko, 1953: fig. 55; 72, *a*; 125, etc.; 1960: fig. 148). Winged animal figurines on a well-known altar from Dzhetysu have similar S-shaped wings with an edge turned frontward (Akishev, 1978: fig. 77). Golden wings "growing" from the backs of ounces (tigers?) that decorate a sacral headdress of an Yssyk chieftain are very much alike the Altaian manner of depicting wings of birds and winged predators (Ibid.: fig. 3, *4*). However, the closest analogs to the predator from the Yustyd mirror are wooden figurines of winged ounces from the Ulandryk kurgans (Kubarev, 1987*a*: fig. 46, *1*, *2*). Thus, the predator engraved on the Yustyd mirror belongs to a wide class of fantastic winged predators typical of ancient Altaian art.

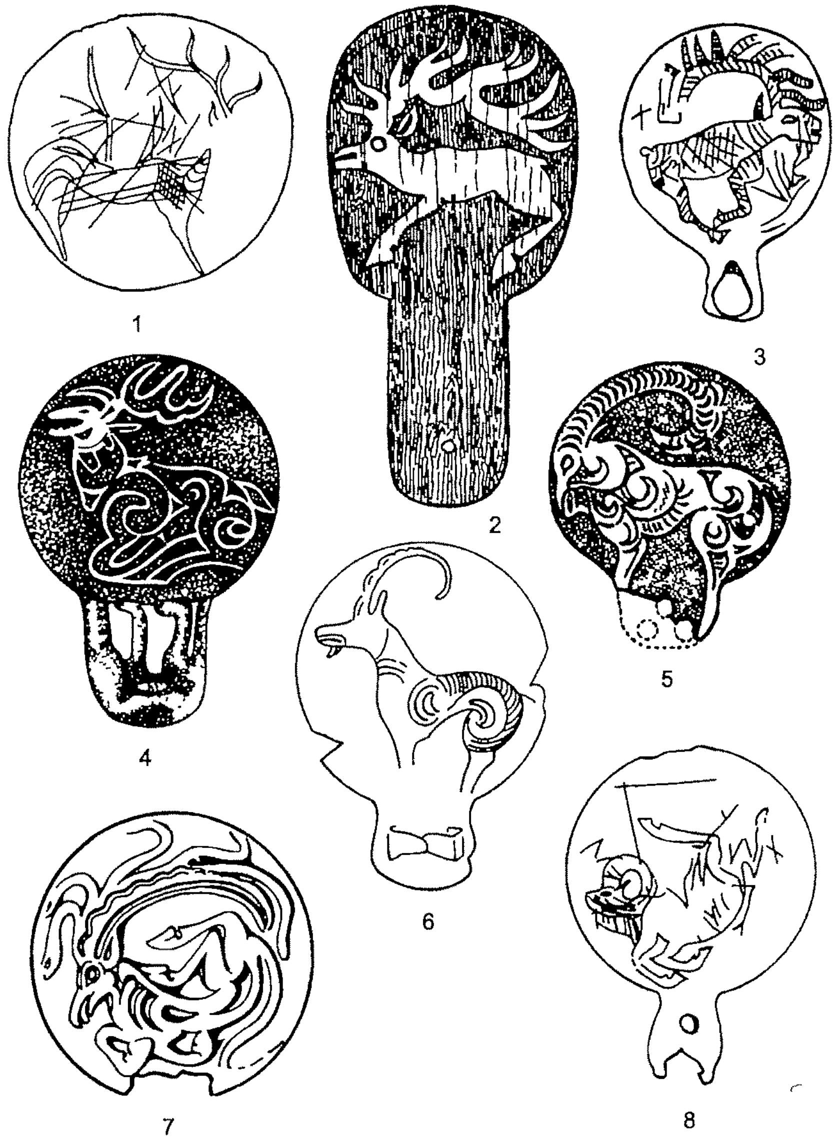

Fig 4 Mirrors of the Scythian period from kurgans of the Altai, Tuva, Mongolia, and North China
1 – Borotal, *2* – Ak-Alakha, *3, 8* – Ulangom; *4* – Ordos, *5, 6* – Aimyrlyg, *7* – Mazhalyk-Khovuzu

The image of a winged predator was adopted by ancient nomads from the Near East, which is evidenced by images of winged lions and griffins from the well-known Amu Darya hoard (Zeimal, 1979: fig. 23, 26–31, 111). However, the image of a coiled predator that is inscribed extremely accurately into the disk of the Yustyd mirror is reminiscent of more ancient Asian local prototypes (Adrianov, 1916: fig. 29; Kubarev, 1979: fig. 26; Gryaznov, 1980: fig. 15, *4*, Volkov, 1981: fig. 6, *7*). Another link in the chain of distribution (from the east to the west) of this most ancient Central Asian image is mirrors from Izmailovka in Eastern Kazakhstan (see Fig. 1, *5*) (Ermolaeva, 1985: 510, fig. 1) and Xinjiang (see Fig. 1, *8, 9*) (Komissarov, 2000: fig. 1, *8*; Varenov, 2000: fig. 2, *10*).

A local origin of the Yustyd mirror is also evidenced by a compositional technique of inscribing smaller animal figures into free space around the main larger animal. This technique was developed by Central Asian artisans of the Scythian period (Grach, 1980: fig. 1, *1*, *2*; Mandelshtam, 1992: table 78, *15–17, 32, 33*; Kadyrbaev, 1966: fig. 62; Kubarev, 1987a: plate LXII, *12*; Bokovenko, 1994: fig. 3, *3*). Several pieces of Savromatian art (Smirnov, 1976: 83, fig. 4, *8*) are produced in the style of "puzzling pictures" (according to (Grach, 1980)) or, in other terms, "zoological puzzles" (according to (Kadyrbaev, 1966)). The parallels listed above suggest the date of the Yustyd mirror of the 5th century BC at the latest.

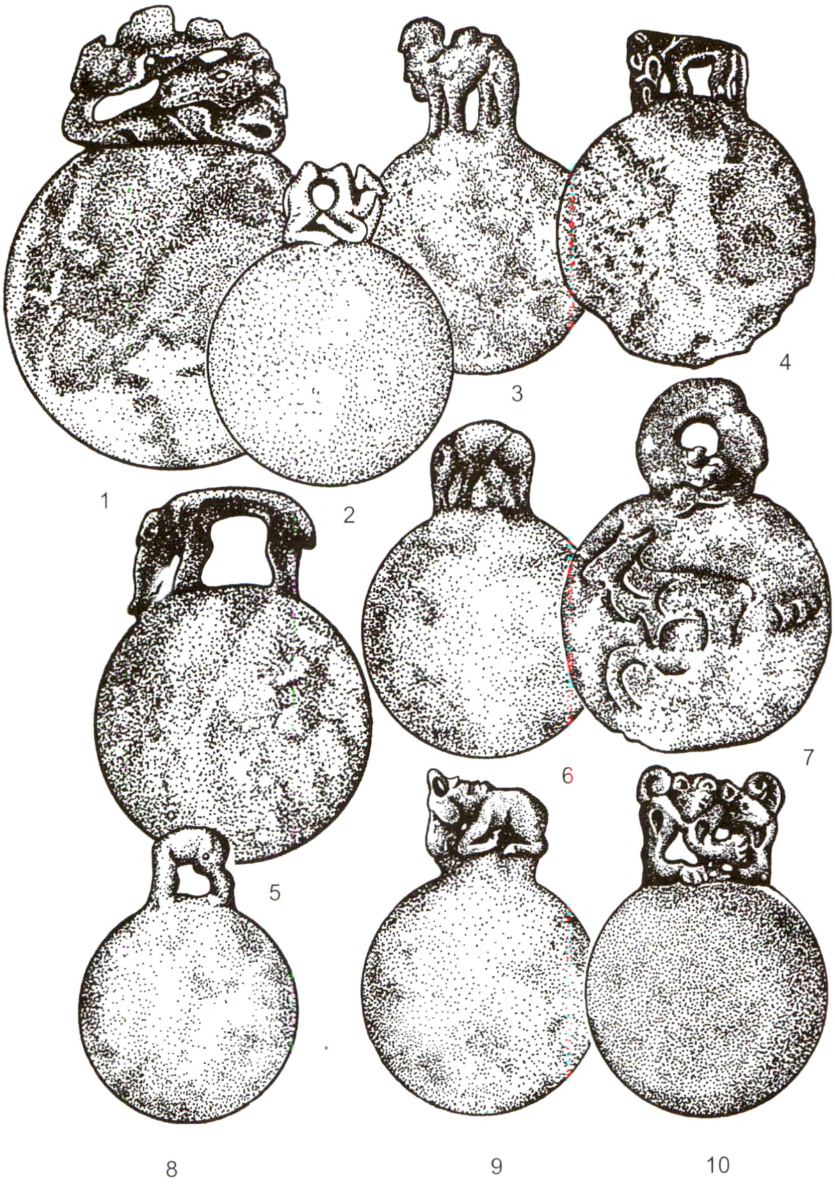

Fig. 5. Mirrors with zoomorphic handles from kurgans of the Altai and Tuva.
1 – Maltalu; *2* – Tytkesken; *3* – Uzuntal; *4* – Bike; *5* – Ulandryk; *6* – Katun; *7* – Alferovo; *8* – Ala-Gail; *9* – Aimrlyg; *10* – Sagly-Bazhi.

Bronze mirrors with engravings and relief images of various animals are found among the artifacts of other cultures of eastern and western parts of Central Asia, such as in the burials of early Tuvinian nomads (Grach, 1980: fig. 53; 113, *1 – 3*; Mandelshtam, 1992: plate 78, *20*, *27*), cultures of Mongolia (Novgorodova et al., 1982: Abb. 36, *1*; 65, *8*), Ordos (Kiselev, 1951: plate XXI, *2*), and Kazakhstan (Kadyrbaev, 1974: fig. 11; Gryaznov, 1947: fig. 4, *11*). Mirrors with engravings on the reverse sides are sometimes found in the burials of western Central Asia (Vishnevskaya, 1973: plate II, *4*; Yagodin, 1978: 83) and the Minusinsk Basin (Kiselev, 1951: plate XXI, *7*; Okladnikov, 1959: fig. 32, *5*; Molodin, Bobrov, Ravnushkin, 1980: plate VII, *1*). Gilt silver and bronze mirrors with fine engravings are reported from the Altai steppe (Umanskii, Shulga, 1999: fig. 11 – 15). Mirrors with images of tigers and boars were also found in the Early Iron Age burials of West Siberia (Troitskaya, Borodovskii, 1994: fig. 25, *1*) and the Volga River basin (Korepanov, 1980: fig. 1, 2).

Various animals are depicted on mirrors and their handles. In the small series considered, they are mostly solitary figures of wild animals: a feline (see Fig. 1, *5*), a deer (see Fig. 4, *1 – 4*; 6, *2*), a goat and a ram (see Fig. 4, *5 – 8*; 6, *3*), a camel (see Fig. 5, *1 – 3*, *7*), a horse and a koulan (see Fig. 5, *4*, *9*; 6, *1*, *4*; 9, *5*) and a wild boar (see Fig. 5, *5*, *6*; 9, *2*). On some mirrors, there are bird images (see Fig. 7, *1*, *4*, *6*; 8, *3*, *5*). Two birds are extremely

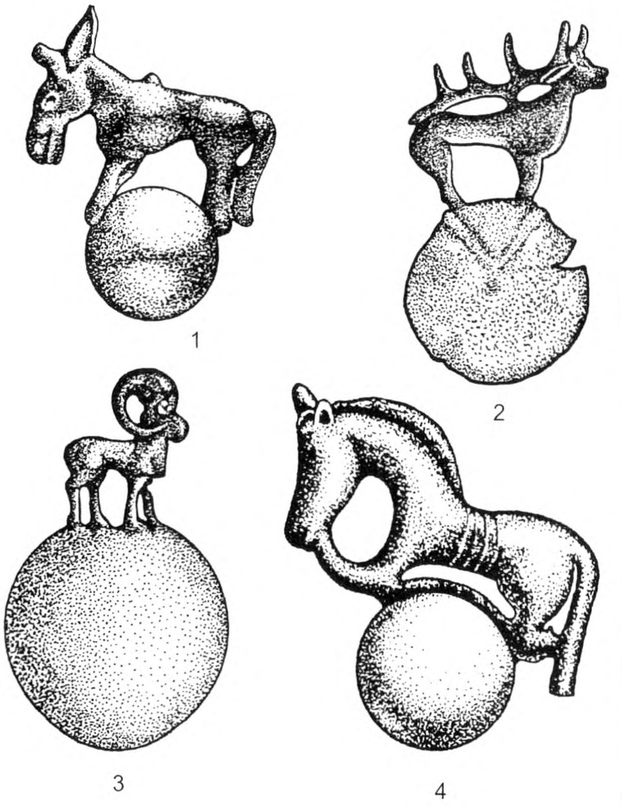

Fig. 6. Mirrors with zoomorphic handles and their imitations.
1, 3, 4 – East Siberia; *2* – China.

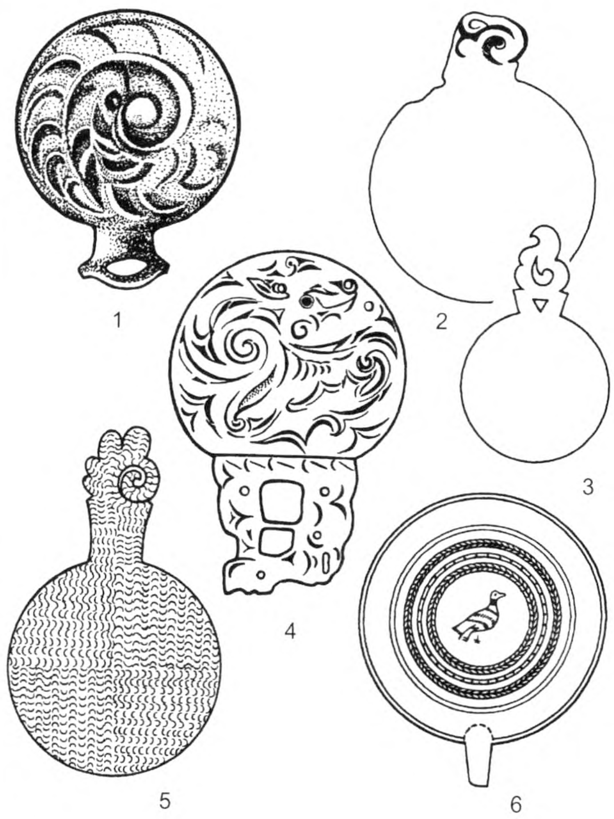

Fig. 7. Mirrors with engravings and handles in the form of bird heads from Khakassiya, the Altai, and Uzbekistan.
1 – Minusa; *2* – Medvedka; *3* – Yustyd; *4* – Balyk-Sook; *5* – Razdumie; *6* – Kaskazhol.

stylized: the head, bill, and wings of these fantastic birds can be hardly distinguished among ornamental elements covering the reverse side of the mirror. It is of interest that on the Altaian mirror the bird eye (a through hole in the disk) is encrusted with gold (see Fig. 7, *4*). Only one mirror that was found in Tuva has a handle depicting combat between two felines (see Fig. 5, *10*).

Anthropomorphic images are unknown on mirrors of ancient nomads, except for a schematic face on a mirror of a "Scythian deity" (see Fig. 9, *1*) depicted on the well-known Sakhnovo golden plate found in the Black Sea region (Onaiko, 1984: fig. 2). Therefore, the interpretation of a mirror handle from Mazhalyk-Khovuzu (see Fig. 3, *6*) as a relief image of a "head of a bearded man" (Grach, 1980: 35) is questionable. Figures of two armed riders on a Mongolian mirror (see Fig. 9, *3*) are obviously added later (the engraving is finer) to the images of horses depicted in a traditional Scytho–Pazyrykian style (Erdenebaatar, 1995). A mirror from the Aidashinskaya Cave that has a portrait of a woman (see Fig. 9, *4*) appears to be an imported one because this engraving has no analogs on either the mirrors of ancient nomads or the art of the Tagar and Kulai cultures of Siberia (Molodin, Bobrov, Ravnushkin, 1980: 33).

We note that the main characters for decoration of the reverse sides of mirror disks are the most popular animals of the Scytho-Siberian artistic style. The same figures are mainly used to decorate handles of some Central Asian mirrors. A new trend was decoration of mirror handles with camel figurines. However, taking into account that such mirrors are reported form the kurgans of the southeast parts of the Altai that border Tuva and Mongolia, the origin of this unusual animal for the Scytho-Siberian art becomes clear. A mirror from the Katun River with a lying camel on the handle (Stepanova, Kiryushin, 1989: 66) is another piece of evidence for adopting this motif by the population of the Central Altai, where another mirror of this type was found long time ago (Fig. 5, *7*). The handle of this mirror can be treated as a stylized depiction of a lying camel with a long serpentine neck and one hump. The posture of the animal and the artistic manner are similar to those of a lying camel on a mirror handle (see Fig. 5, *1*) from one high-mountain kurgan of the Chuya Valley (Kubarev, 1992: fig. 27, *1*).

Also should be noted the mirrors whose handles are produced using an artistic technique typical of Scytho-Siberian art, which complied with the most ancient rule of partial magic – "a part instead of the whole." In other

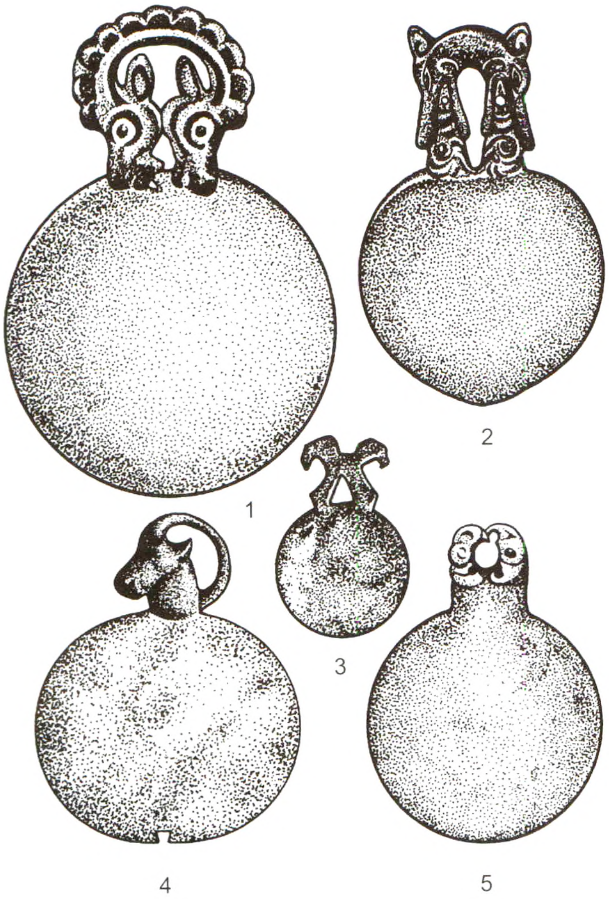

Fig. 8. Mirrors with handles in the form of heads of animals and birds.
1 – 3 – Minusinsk Basin; *4* – Maltalu, the Altai; *5* – Ulangom, Mongolia.

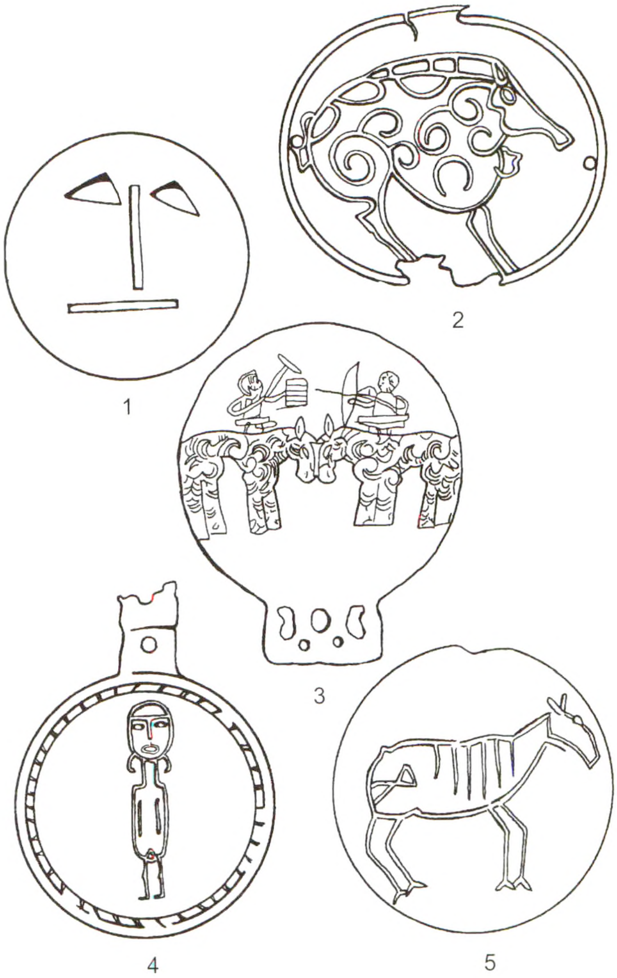

Fig. 9. Mirrors with engravings from various regions of Eurasia.
1 – Black Sea Region; *2* – southern Urals; *3* – Mongolia;
4 – East Siberia; *5* – West Siberia.

words, the handles were cast only in the form of heads of birds and animals (see Fig. 7, 8). On some specimens, the degree of stylization of the images is so high that one can hardly recognize planar half face images of predatory birds* (cf. Fig. 7, *2* and 7, *3*, *5*; 8, *3*).

The disks of other mirrors show iconographic scenes that reflect concisely and exactly various fragments of cosmogonic myths. The participants and main heroes of these scenes are only predators, fantastic creatures, and herbivorous animals. Zoomorphic mythical images can be composed in different combinations: two fantastic predators, a deer and a bird (see Fig. 1, *1*), a feline (?) and a deer (see Fig. 1, *2*; 3, *1*), two "dragons" and six birds (see Fig. 1, *3*), two wild boars and a deer (see Fig. 1, *4*), five deer and one goat (see Fig. 1, *6*), a wolf, a boar, and a horse (see Fig. 1, *7*), a feline, a roe deer, a saiga (?), and a wild boar (?) (see Fig. 2), a goat and a horse (?) (see Fig. 3, *2*), a fantastic predator and an argali's head (see Fig. 3, *4*), a fantastic predator and a deer (see Fig. 3, *5*), and three tigers (see Fig. 11, *1*). Such diversity in characters and their combinations suggest different interpretation of the scenes depicted on the mirrors. Thus, on early mirrors, predators and herbivorous animals are depicted without any connection, i.e., a principle of a compositional meaning or narration is absent (see Fig. 1, *1* – *4*). On other mirrors, these animals are shown opposing one another, and the heads of herbivorous animals are close to predators' mouths or even depicted clasped in predators' claws (see Fig. 1, *7*; 3, *4*). Obviously, this rather simple technique was used to show the moment of torment, or to be more precise, the beginning of swallowing an herbivorous animal by a predator or a fantastic creature, a very popular and traditional scene in the Scytho-Siberian art. Generally, all pictures on the

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* There is another approach to treating handles of such mirrors. Thus, V.E. Larichev recognizes in these mirrors the features pertinent to "...a fantastic serpent – a dragon (griffin)" that is sitting beside the roots of the World Tree, whose "trunk is a handle and a crown is a mirror disk" (1998: 274 – 275).

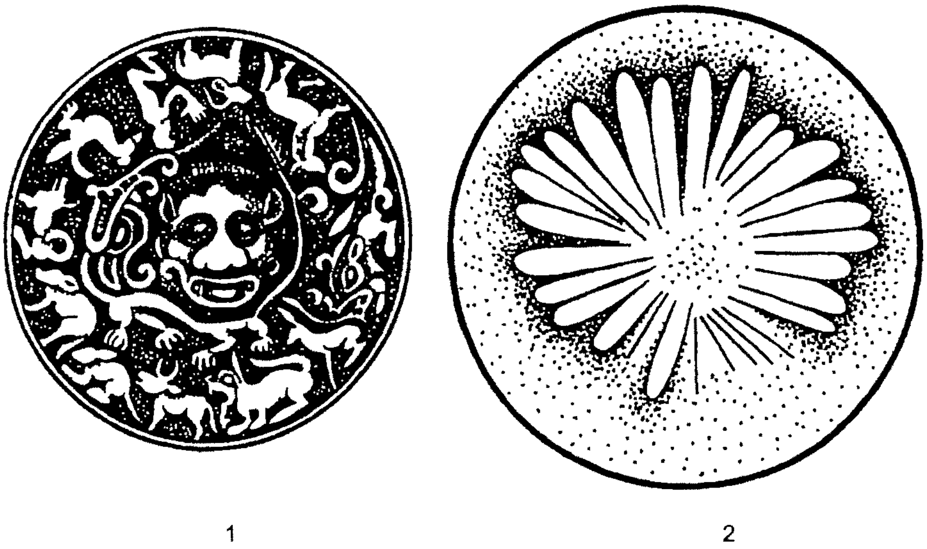

Fig. 10 Mirrors of the medieval (*1*) and ethnographic (2) periods found in the Altai.
1 – Ongudai, *2* – Ulandryk

mirrors have direct analogs in the art of the Pazyryk Culture of the Altai and other nomadic cultures of eastern Central Asia. A.D. Grach was among the first to note that on the Mazhalyk-Khovuzu mirror, the fantastic creature is depicted in the Pazyryk–Saglyn manner (see Fig. 4, *7*). He believed that this creature combines features of five animals: a griffin's head, a body of an ungulate (the croup is turned up), a tails of a feline, one antler of a mountain goat and another antler of a maral (Siberian deer) (snakes are emerging from antler points). A closest analog to this figure is among the tattoo motifs on the chieftain from the Second Pazyryk kurgan (Rudenko, 1953: fig 181, 182). Among the finds from the Mazhalyk-Khovuzu burial ground, there is one more fantastic creature with a dog body and horse legs (the legs are bent) that is tormenting a head of a mountain ram" (Grach, 1980: 79) (see Fig. 3, *4*). The last scene is a copy, although concise, of a well-known carved composition on a log-coffin from the Second Bashadar kurgan (Rudenko, 1960: 47, fig. 21). Scenes on bronze clasps from the Minusinsk Basin and the Ordos region are similar to them stylistically and iconographically (Artamonov, 1973: fig. 149, 199)

In the Tuva series, a mirror from the Sagly-Bazhi burial ground is of particular interest (see Fig. 3, *5*). On this mirror, there is a fantastic predator with a head of an ounce and a body and legs of an ungulate (horse?). This figure is placed over the unfinished or poorly preserved image of a deer with S-shaped antlers. Some details of these images, such as antlers of a specific form and a predator's "mane" that have analogs among the Pazyryk and Ulandryk artifacts (Rudenko, 1960: fig. 60; Kubarev, 1987a: fig. 44, plates XXVII, *9*; LXIX, *3*), suggest that this mirror can be attributed to time of the peak of Altaian animal art and the heyday of "Scythian-like" tribes in Central Asia. It is in the 5th – 3rd centuries BC when a symbolic and canonized image of a "cosmic deer" became widely spread over the mountain–steppe parts of the Central Altai. Depictions of the deer, previously known only on the so-called "deer stones" and petrogliphs, become main motifs in the sets of zoomorphic decorations of nomadic headdresses. Mirrors from Borotala, Ordos, Ulangom, and Ak-Alakha (see Fig. 4, *1* – *4*) can obviously be dated to the same period. The reverse sides of these mirrors have single figures of the deer depicted in a typical Scytho-Pazyrykian manner. The deer image appears to be in a close semantic connection with an opposing figure of a predator (wolf?) on a mirror handle from Ordos (see Fig. 4, *4*).

Other pictures on Central Asian mirrors have close parallels or even exact analogs in Pazyryk art. Thus, highly proportional and extremely realistic figures of a Siberian ibex on mirrors from Aimyrlyg in Tuva (see Fig. 4, *5*, *6*) are stylistically close to images on belt plaques from Pazyryk (Rudenko, 1953: plate XXVII, *2*) and to wooden figurines of syncretic rams with golden goat horns from the kurgans of Ulandryk (Kubarev, 1987a: fig. 44). All details of a sketchy figure of a mountain goat on the Ulangom mirror (see Fig. 4, *8*) repeats the iconography of a mountain ram tattooed on the right hand of a chieftain mummy from the Second Pazyryk kurgan (Rudenko, 1953: fig. 174).

Origin and functions of Asian mirrors

A find from the Ob River basin (Novosibirsk Province) is special among other mirrors described in this paper (see Fig. 11, *1*). The construction, form, and the image of a tiger on the reverse side of the mirror disk are assumed

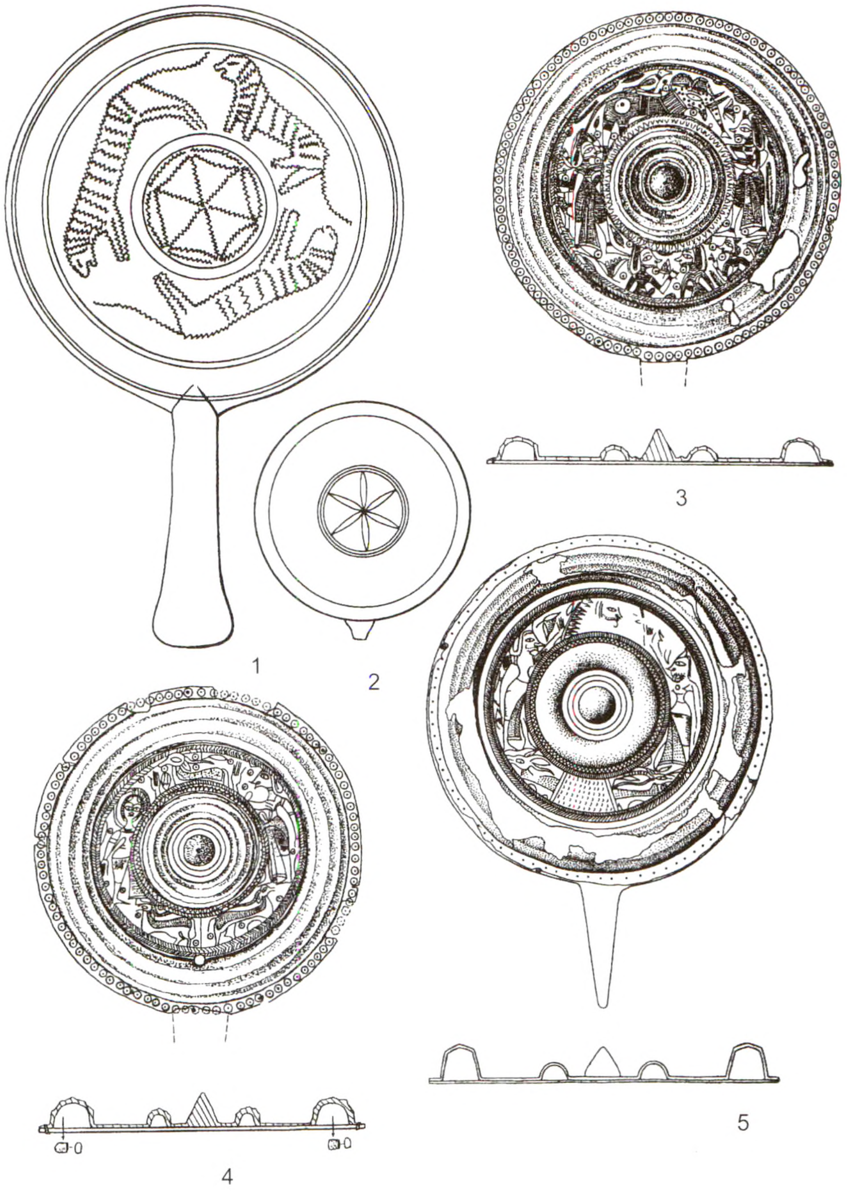

Fig. 11. Mirrors of the Savromat—Sarmatian type from various parts of Asia.
1 – Bystrovka (Novosibirsk Ob region); *2* – Frunze (northern Black Sea region); *3* – Rogozikha, *4* – Lokot (steppe Altai);
5 – Mechetsai (southern Urals).

to originate from Iranian or Central Asian samples. However, one cannot ignore possible cultural affinity of this mirror with the Saka world (Troitskaya, Borodovskii, 1994: 96, fig. 25, *1*). Indeed, there are no direct analogs to realistic depictions of tigers in the Scytho-Siberian animal style; we only might refer to a single analog, one of tiger figures carved on a log-coffin from the Bashadar kurgan that was cited by the authors (Ibid.: fig. 25, *2*), although the geometrical composition with a hexagonal figure enclosed between the two concentric circles (solar symbol?) in the center of the Bystrovka mirror can be compared with "six-petal rosettes" in the center of many Sarmatian mirrors (see Fig. 11, *2*) (Smirnov, 1984: fig. 42, *6*; 50, *1*, etc.). The form of this mirror can also testify to its Sarmatian origin, i.e., it could have been made in the western Ural region. Most probably, imported mirrors served as prototypes for the Bystrovka one, which were similar to the unique masterpieces found in the Altaian kurgans (see Fig. 11, *3*, *4*) (Umanskii, Shulga, 1999, fig. 11 – 15; Rudenko, 1953, fig. 84) and in the Mechetsaiskii kurgan (see Fig. 11, *5*) (Smirnov, 1975, fig. 57). Their construction (two riveted silver or bronze disks gilded from outside), sizes (diameter of 14 – 15 cm), motifs, and artistic style are undoubtedly different from those of ancient nomads. Therefore, a comparative analysis of these specimens cannot yield any positive results.

However, it is reasonable to believe that the images on the Savromatian mirrors were also borrowed by the Ananyino population from the peoples inhabiting the eastern and southern parts of Central Asia. This assumption is supported by several finds, such as a mirror with an engraved argali (a wild sheep) from the Orsk burial site in the Orenburg Province (Smirnov, 1977: fig. 11, *1*) and a mirror with a boar from the Selitrennoe settlement (see Fig. 9, *2*). The posture of the boar on the last mirror is typical of the other boar images in Central Asian art (see the summary table (Samashev, 1992: fig. 173)). K.I. Korepanov believes that an eastern (Altaian) influence, namely the tradition of decorating animal bodies with spirals, can be seen in the animal figures depicted on the mirrors from the Volga River basin (1980: 286).

Thus, we conclude that although being different in their local features, the mirrors from different parts of eastern and western Central Asia are very close in a general magical meaning of the engraved images, which intensified protective properties of mirrors. These mirrors differ from a large collection of mirrors from the Minusinsk Basin mostly including specimens of Chinese origin, the earliest of which are dated to the 4th – 3rd centuries BC (Lubo-Lesnichenko, 1975: 7). Obviously, this period is the latest date of the existence of Central Asian mirrors with engravings, and the earliest date is the 8th – 7th centuries BC. A reasonable question arises as to whether such mirrors, when appearing in China, copied the South Siberian specimens or these two branches developed independently. At first glance, the answer is obvious if one takes into account the more ancient origin of the Siberian mirrors. However, in the territory of modern China, archaeologists have discovered about 60 bronze mirrors of the Yin, Western Zhou, and Spring and Autumn times that are typologically related to the South Siberian mirrors. The most ancient of these mirrors date to the 13th – 11th centuries BC (Varenov, 1985: 164; Komissarov, 2000: 456). Among these mirrors, there are samples with engravings (see Fig. 1, *1*, *3*, *8*, *9*), which correspond to certain scenes on Central Asian mirrors and "deer stones," and handles in the zoomorphic style (see Fig. 4, *4*; Fig. 6, *2*). Nevertheless, Chinese mirrors are not local products. This is evidenced by an analysis of the metal content of the most ancient of these mirrors and comparison of the artistic motifs, typical of the Late Bronze Age culture of Mongolia, particularly, those seen on the "deer stones" (Varenov, 1985: fig 3, *1*, *2*). Thus, it is quite reasonably to speak about the earliest borrowings in ancient Chinese art from Siberian sources. "Obviously, the mirror had no sacred meaning in the Chinese culture as it had, for example, in Siberia, where mirrors had been in use as a cult attribute since the Karasuk Culture, synchronous to the Yin epoch" (Ibid : 168). We note that bronze mirrors, which were widely spread in North Asia in the Karasuk period (Kiselev, 1951: plate XII, *23*; Margulan, 1979: fig. 90, 2; Vadetskaya, 1986: 56, plate V, *11*; etc.), originate from the Andronovo period (Gryaznov, 1956: plate III, *3*). Numerous depictions of mirrors on the so-called "deer stones" suggest their use in rituals (Volkov, 1981: 137, 177, 199, etc.). Round holes imitating mirrors were intentionally placed above the images of various weapons: bow, arrows, daggers, and shields. Ancient people probably believed that these hole–mirrors should have had a magic influence on these weapons, thereby contributing to their power. These most ancient beliefs were observably reflected in the burial practice of the Pazyryk population of the Altai. In the kurgans of the Chuya Valley, weapons are often found in assemblage with a mirror and a leather bag, which contained various amulets, such as a comb, animal fangs, cowries, human teeth, etc. (Kubarev, 1981: 4, fig. 7, 2).

Ancient Altaian nomads used to wear mirrors fastened to their belts with the mirror handles upward. The mirrors were put into felt or leather bags, which were often decorated from the face side with colorful applications. We are aware of several cases when mirrors were placed into hands of the deceased. In the kurgans of Ulandryk and Yustyd, metallic mirrors were used as cult and magic attributes not only in female but also in male burials, they were also found in children's burials. However, some intact twin burials in the Yustyd burial ground contained no mirrors. Mirrors were obviously replaced by wooden imitations, which have not preserved until present. This is evidenced by the only mirror imitation found in one of the Yustyd kurgans (the total number of excavated kurgans is 44) and well-preserved wooden models from Ulandryk and Barbugazy (Kubarev, 1987a: fig. 34, *1* – *4*; 1992: fig. 27, *17*).

The distribution of mirrors over the burials suggests that larger items most often belonged to women, while smaller ones to men and children. In the Altai, several burials, mainly twin ones, contain identical mirrors, probably cast in one mould. This fact supports our hypothesis on the local production of most Altaian medal-shaped mirrors. They were cast purposely in small series (2 – 3 specimens) for the burial rite. These mirrors, as well as bronze weapon models, were not even finished after casting: they have visible traces from moulds, and seams and rough places on their surfaces were not polished. At least more than one third of the Altaian mirrors were never in use by their owners during their lives; they were produced exclusively for the burial ceremony. Wooden imitations of mirrors reported only from the Pazyryk kurgans had the same function.

A large number of bronze and wooden mirror imitations in nomadic burials in the Sayano-Altai Mountains is explained by the tradition to deposit substitutions of real things into graves at the end of the

1st millennium BC. Obviously, this tradition came into use because metallic imported mirrors were extremely rare and highly valuable among ancient nomads of this region during all periods (Lubo-Lesnichenko, 1975: 5). Having been in use for centuries, these precious things passed from one generation to another, and only worn and damaged fragments were buried with their owners. Such mirrors or their fragments from the Altaian collection usually have broken handles and sometimes holes for fastening them to the belts. Many examples have traces of frequent repairs. However, several fragments of this collection deserve special attention. They are in the form of a triangle, comprising one third or one forth of the whole disk. Visual examination of the edges of these fragments showed that these mirrors were intentionally broken before burying Large fragments of mirrors, also triangular in form, are known from the other burials of the Pazyryk Culture (Rudenko, 1953: fig. 85; Savinov, 1978: fig. 1, *14*; Kubarev, 1987a: plate XXXIV, *b*).

The mirror as a source of magic, mythology, and ideology

It is well known that mirrors played an important role in cult and magic of many Eurasian peoples. However, the mirror had a double meaning among the Scythians and Savromatians: it served both as a female toiletry article and a ritual object. On the other hand, the Central Asian nomads endowed mirrors with magic properties and used them as protective amulets. Tagar and Pazyryk warriors went into battle with mirrors on their chests (Martynov, 1979: fig. 32). Probably, they believed that the mirror contained a human soul and had a magic ability to read the past and the future. The Scythians took the mirror as an attribute of divine power and a source of magic force (Khazanov, 1964: 93). Among the Savromatians, the mirror was a ritual attribute of priestesses, and prior to burying, it was broken (Smirnov, 1964: 152) or thrown into fire (Vysotskaya, 1976: 69). We may only guess whether these actions signified a release of the soul of the deceased or elimination of the magic mirror power. Intentionally broken mirrors from several kurgans in Yustyd and Ulandryk obviously had the same meaning This fact also testifies to the circle of magic superstitions common among the nomadic tribes of eastern and western Central Asia. As A.V. Marakuev believes, intentionally broken mirrors served as a keepsake in sign of parting of relatives, a couple, or lovers or as an identity sign of a secret envoy, who joined the fragment to the one kept by an addressee (1947: 171). B.A. Litvinskii is more specific in explaining the meaning of a broken mirror in a grave. He thinks that the other half or even several parts of the mirror were kept by living relatives of the spouse of the deceased so that he (the dead) could find a close person in the Afterworld (1978: 107).

A mirror did not lose its magic properties or value even if it was accidentally broken into small pieces. Small fragments of such mirrors with holes in them were in continuous use as amulets*. Several such mirrors with smooth edges and some central knobs were in one assemblage of decorations from kurgan 17 of Yustyd XII. Mirror fragments were used similarly by other Eurasian peoples (Levashova, 1947: 48; Smirnov, 1975: 167; Litvinskii, 1978: 109; Diakonova, 1970: 195). There is also a common belief among many cultures that a broken mirror bodes evil, even death of loved ones. The custom of covering mirrors with a blanket after the death of a relative can explain why mirrors from the Altaian kurgans were found sewn into felt bags. As nomads believed, mirrors could reflect the face of the deceased; therefore, the ability of the mirror to reflect the Afterworld and its inhabitants was neutralized in this simple way

Many scholars believe that the mirror was a symbol of the sun and light (Khazanov, 1964: 89; Martynov, 1979: 135; etc.) or a sign of fertility and a female deity (Khazanov, 1964: 93, Onaiko, 1984: 24). Others see the relation between mirrors and astronomical objects, implying their use as solar calendars (Marsadolov, 1982: 30 – 33; Larichev, 1998: 270 – 275). Among the ornaments decorating reverse sides of mirrors, one can see motifs from various myths and legends (Lubo-Lesnichenko, 1975: 21; Sarianidi, 1981: 291; etc.).

This diversity in opinions is due to a difference between the ancient and modern notions about magic functions of the mirror. It also stems from a great number of motifs depicted on the mirrors and difficulties that arise in classifying the compositions. However, even a first glance at the motifs on the Altaian mirrors reveals that among many zoomorphic creatures, the most popular were images of a feline and an ungulate herbivorous animal. On some mirrors these images neighbor peacefully, while on others, herbivorous animals are in agony and predators are killing and eating them (compare Fig 1, *1*, *2* and 1, *7*; 3, *4*). In many cases, the torment scenes are shown only conditionally: a predator overlaps an ungulate. This posture can be seen on a mirror from Borotal (see Fig. 3, *1*) and on a mirror from Tuva (see Fig. 3, *5*). These scenes are stylistically and artistically laconic. They seem to be full of mythological meaning, which narrates the most remarkable moment of a Eurasian myth about a "cosmic chase." This interpretation agrees with some evidence from the northern Buddhist sources about lunar and solar eclipses, which were related to a myth about Rakhu

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* We believe that for an original mirror model from the Ak-Alakha burial (Polosmak, 2000 fig. 81 – 83), ancient Pazyrykians used a large piece of a real mirror. A similar bronze imitation of a mirror in a wooden frame was found in a Borotal kurgan (Mogilnikov, Surazakov, 1980 fig 5).

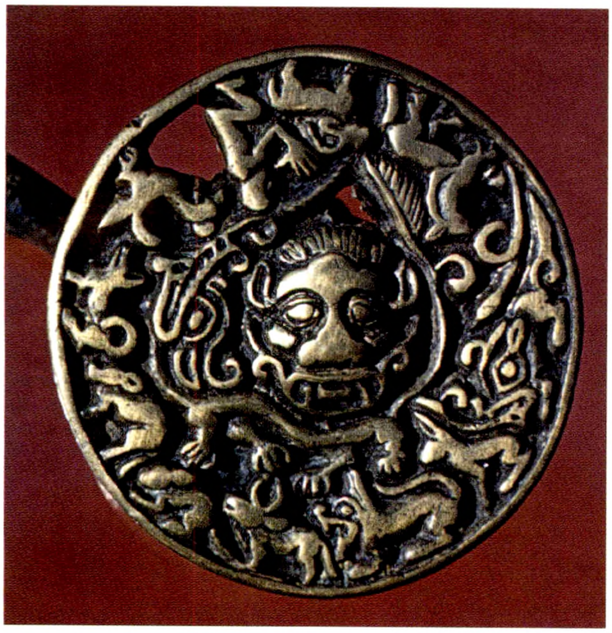

Fig. 12. Mirror with zodiac signs. Ongudai, the Altai.

(Arakha), a dragon swallowing stars (Neklyudov, 1992: 372 – 373). Both Altaians and Tuvinians were scared of lunar eclipses. "The Altaians thought that during lunar eclipses, the Moon was swallowed by Dzhelbegen, a mythical hero in the body of a multi-head creature" (Diakonova, 1976: 287). With further development of this ancient myth, the role of a deity was played by a bright heaven deer and his chaser was a predator. The scenes of attack (and also torment and feast) became an artistic canon in the Scytho-Siberian art. It is known that the Pazyryk population of the Altai borrowed torment scenes from the Near East, which is evidenced by a similarity in the stylistic interpretation of images on some items from the Amu Darya hoard (Kuzmuna, 1979: 8). Torment scenes depicting peaceful ungulate animals attacked by fantastic creatures have been known in Central Asia on seal–amulets from Margiana since the 2nd millennium BC (Sarianidi, 1976: 48 – 50, fig. 1 – 2). Unique bronze Bactrian mirrors with scenes with serpents and dragons as main heroes, which personify two different natures, are also dated to the 2nd millennium BC (Sarianidi, 1981: 291). Obviously, all these superstitions originate from even more ancient agricultural cults. As early as in the 5th millennium BC, Sumerian priests could note a very important moment in the agricultural cycle: on the night before sowing, in the spring sky, people could see for the last time the Pleiades (Taurus star) and Cassiopeia (Deer star) disappearing below the horizon and the Leo constellation with the bright star Regulus at the peak. In Sumerian art, this important astral event was interpreted as the victory of Lion over Taurus and Deer.

In one of the first Siberian variants of this widely spread myth, the role of a chaser is played by a fantastic creature that has a complex syncretic nature. Its earliest depictions were found at the rock art site of Shishkino Rocks on the Lena River (Okladnikov, 1959: fig. 39), in the Okunevo Culture of the early Bronze Age (Vadetskaya et al., 1980: plate XXIII, *1*), and on Mongolian "deer stones" (Novgorodova, 1984: fig. 2, 37 – 39). Depictions of fantastic monsters – swallowers in the rock art of the Altai – date to the middle Bronze Age (Kubarev, 1979: fig. 28; 1987b: fig. 1).

A coiled body of a predator biting its tail or tormenting a victim is associated with both the upper and the lower cosmic zones, the latter being identified with the lower cosmic world. As D.S. Raevskii believes, the Scythian variant of a coiled predator is analogous to the image of Sheshi, the World Serpent in Indian mythology (1985: 119). The Serpent is the world's support and the Earth lies on its coiled body. It is thought to be a symbol of eternity and the entire cosmos. This interpretation correlates well with the decorative motifs of the mirrors considered, which depict birds, deer, roes, horses, and goats symbolizing the Middle World, i.e., the Earth, and fantastic predators and wild boars are related to the Underworld. Probably, the round mirror disk with its undoubtedly solar–astral motifs is a symbol of the third cosmic element – the sky. Such mirrors can be reasonably correlated with an emblem of life widely known in the Asian mythological system that reflects the essence of two polar natures, Yin and Yang (Kubarev, 1985: plate II).

Numerous 13th – 16th century mirrors found in the Minusinsk Basin suggest that mirrors were popular among the local population in the medieval period (Lubo-Lesnichenko, 1975: 29). Chinese mirrors of subsequent periods are considered to be of small artistic value because they lost their symbolic and decorative content. For this reason, they have been studied insufficiently and are almost unknown from the Altai and Tuva. Therefore, two mirrors of this type found in the Altai are of considerable importance. One of these mirrors, probably dating to the 17th – 18th AD, was found in a secondary burial of the Ulandryk burial site. The mirror is a massive bronze disk (13 cm in diameter, 0.3 – 0.4 cm thick) with a vertical border. On its reverse side, radial divergent beams are shown in a low relief technique (see Fig. 10, *1*). The semantics of the picture are extremely simple: the mirror disk with beams symbolizes the Sun. Another 18th – 19th century mirror–pendant (5.5 cm in diameter, 0.3 cm thick) is exhibited at a school museum in the village of Ongudai (the Altai Republic). The reverse side of the mirror has 12 animals of the animal calendar cycle depicted in low relief (see Fig. 10, *2*; 12). An analogous 13th – 15th century mirror with zodiac signs is deposited at the Minusinsk Museum (Ibid.: 89, fig. 82). These mirrors are very similar to one another because they have a round pierced knob in the center On the Ongudai mirror, the knob is in the form of a demon's head. These finds suggest that some mirrors, similar to ancient ones, continued to be used as calendars. From ethnographic sources, we know that note that mirrors with similar motifs were widely spread. Tuvinian B.K. Mongush reported that once a famous shaman caught *kuzungu eeren*, a shamanic mirror in the form of a magic disk whose reverse side was decorated with twelve animals (Kenin-Lopsan, 1987: 57). *Kuzungu* was thought to be the most powerful of the shamanic attributes and was known to the Yakuts under the name *kyusenge* (Alekseev, 1984: 146, fig. 3). It is interesting to note that several *kyusenge*, as well as their more ancient prototypes, had engraved animal images. As the Tuvinians believed, *kuzungu* mirrors were of heavenly origin and were considered to be "the main aid of a shaman when he treated patients for headache or paralysis because the source of these diseases was Heaven" (Kenin-Lopsan, 1987: 56). The Tuvinian shamans used to say that they got a *kuzungu* from Heaven. In many shamanic songs, the mirror is an attribute of supernatural origin, being a partner of a shaman and an enemy of evil spirits. Ancient beliefs can be clearly traced in other superstitions of the Tuvinians. For example, setting out, a shaman always took his mirror with him, wrapped it into a piece of white fabrics, and put it near his bosom. Some shamans kept their mirrors in special felt bags and fastened them to their belts. After a shaman's death, the mirror of the deceased was inherited by his successor (usually, one of the relatives). However, if the deceased shaman had no successors, the mirror was buried with him and, according to shamanic beliefs, it returned to Heaven (Ibid.: 58).

The data presented show a special role of mirrors, which were used for magic and protective purposes in Tuvinian shamanism. The mirror not only protected a shaman from evil influences but also served for connection between him and Heaven.

Conclusion

The following conclusions were drawn from a comparative analysis of the collection of Altaian mirrors:

1. In the culture of ancient nomads, mirrors served as a magic attribute, fetish, or amulet, protecting from evil spirits and also as a necessary attribute of a ritual, which was used to establish a spiritual contact between the deceased and the Afterworld inhabited by ancestors. According to the traditional burial rite of ancient Altaian nomads, a mirror (or its model) was given not only to women but also to men and children.

2. Most "medal-shaped" and "arc-handled" mirrors found in the Altai and Central Asia were domestic products, which is evidenced by identical series cast in the same mould exclusively for the burial ceremony

3. The decorative motifs on mirrors, which often repeated, have close parallels in Scytho-Siberian art and mythology of ancient Eurasian nomads.

4. Available information about the mirrors suggests a wide spectrum of prehistorical superstitions about the magic power of these items. Certain omens and beliefs related to mirrors have been preserved among many Siberian peoples to the present.

5 Engravings on the mirrors found in reliably dated burial complexes of ancient nomads of the Altai, Tuva, and Mongolia can be used in dating numerous Asian petrogliphs.

Thus, as we have shown, nomadic mirrors, which have not attracted much scientific attention so far, contain valuable information on the ideology of ancient Central Asian peoples

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A SANCTUARY ON THE ZHINISHKE RIVER AND ISSUES OF THE ORIGINAL APPEARANCE OF THE KYPCHAK STELAE

Introduction

I.A. Kastanie described the typical appearance of a ritual construction with carved stone stelae from the Kazakh steppes early in the 20th century, writing: "People often make a funnel-shaped hole in the upper portion of the burial mound, which reveals one or several stone stelae" (1911: 10). Intense investigations of such constructions began only in the late 1970s (Ermolenko, Gertsova, Kurmankulov, 1985). Constructions containing stone stelae in earthen piles have been classified as Kypchak "sanctuaries," which may be further subdivided into four types (Ermolenko, 1991):

1. One or several stone stelae are placed in one or two lines inside a chamber formed by the four walls of a stone enclosure. Such a construction is consequently covered by an earthen mound.
2. The construction of type 1 is adjoined from the west by a greater cairn.
3. Two small mounds are constructed along a north-south line. The mounds are surmounted by rectangular stone pavements containing stone stelae. The whole construction is surrounded by a shallow ditch.
4. One or a chain of several stelae adjoin a cairn from the east.

In 1990, the authors of this paper investigated such a ritual construction with stelae on the Zhinishke River in Central Kazakhstan. We are going to suggest a possible reconstruction of the original appearance of the Kypchak stelae on the basis of this unique discovery.

Description of the sanctuary with stelae

The ritual construction with stelae is located 700 – 800 m to the southwest of the Kyzyl-tubee hill in the Kyzyl-Arai massif (Aktogai administrative region, Dzhezkazgan Province (presently Karaganda Province, Kazakhstan). It was constructed on the high right bank of the Zhinishke River, on a promontory formed by a nameless stream flowing into the Zhinishke (Fig. 1). A late Kazakh cemetery is also located at this place.

Prior to excavations, the site looked like a stone mound (0.6 m high and 11 m in diameter) covered with sod. Some stones were noted on the surface. The western extremity of the mound was delimited by a stone pavement up to 2 m wide. A hollow, up to 2 m wide, 0.2 m deep, adjoined the northeastern portion of the mound. The southeastern portion of the mound was vegetated by bushes. Five stelae were erected in the middle portion of the mound; its height over the contemporary surface varied from 0.2 to 0.7 m. A depression up to 0.2 m deep was noted in the mound to the northeast of the stelae.

The excavation site occupied an area of 196 sq. m; its sides faced the four cardinal points. Two axes were established in the excavation zone. Upon sod removal, a ruined construction of irregular-shaped slab stones was exposed. The sizes of the slabs varied from 10 × 20 × 5 cm to 30 × 60 × 10 cm (Fig. 2)*. The oviform construction had dimensions of 11 × 13 m, the longest axis oriented from the north–northeast to the south–southwest. The central portion of the construction revealed the remains of three sides of an enclosure surrounding the stelae. The main axis of the enclosure was oriented from the north-northeast to the south-southwest. The position of stone inside and outside the enclosure was irregular. The stones probably originated from the decomposed upper portion of the enclosure. A hollow was located in the

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* Working sketches and drawings of the stelae were made by O.P. Cherepanova.

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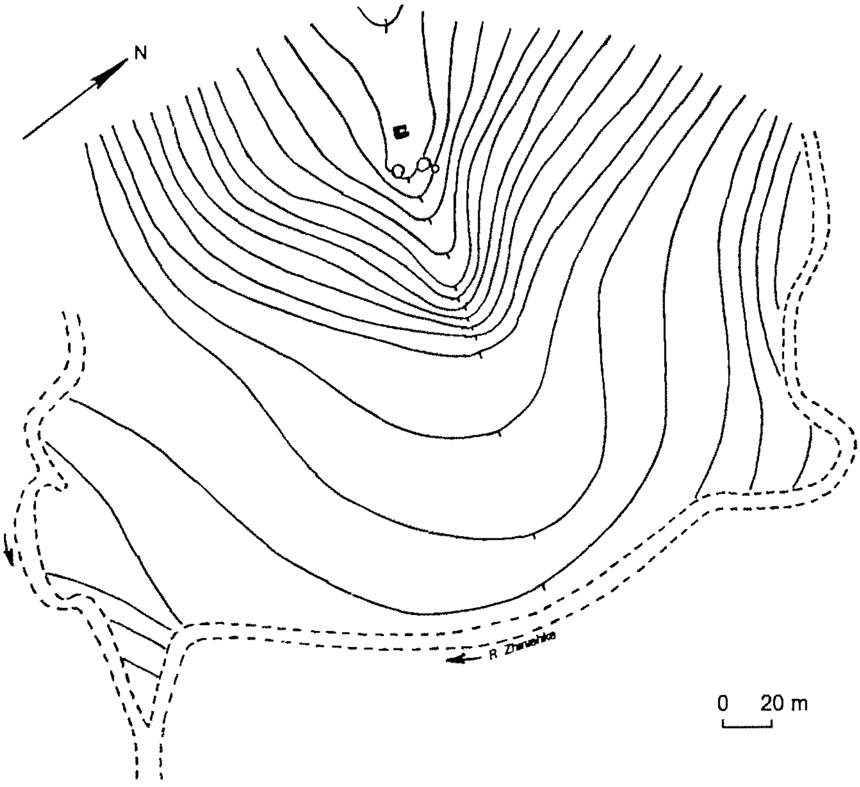

Fig 1. Topographic plan showing the position of the ritual construction with stelae at the Zhinishke site. Contours 1 m.

pile of stones opposite the assumed northeastern wall of the enclosure.

In the process of excavating the upper layer of sod and removing stones, phalanges and a lower tooth of a horse were recovered, as well as a mandible and rib fragments of some small ungulate*. At the southeastern border of the stone pile, a forged iron nail was found (Fig. 3, 2). The southern portion of the pile inside the enclosure yielded a distal fragment of a humerus of a small ungulate, a stone disc-shaped spinning whorl (Fig. 3, *3*), and pieces of partly rotten wood. On top of the southwestern wall, a fragment of a rim from a ceramic hand-made vessel was found (Fig. 3, *1*). The new fracture surface of the noted potsherd shows black coloration suggesting an admixture of mica.

Upon removing the pile of stones, the outlines of the enclosure became clear. It represents a massive construction, nearly quadrant in shape (5.6 × 5.8 m), with slightly rounded corners (Fig. 4, 5). The width of the walls varies from 1.2 to 1.6 m; the maximum preserved height is 0.5 m. The structure of the enclosure represents layers of flat granite rocks. The laying consists of two to six stone layers cemented with the dense, grayish-brown soil filling, up to 0.6 cm thick. Initially, the enclosure was closed; later a gate about 1 m wide was made in its northeastern wall. The upper layers of stonework were removed, while the big lower slabs were fractured. The northern portion of the excavation area exhibited a concentration of stones opposite the entrance gate presumably originating from the stone working of the enclosure.

The inner chamber delimited by the enclosure had a size of 2.8 × 3.0 (?) m. The filling of the chamber revealed charcoal pieces, rotten wood dust, and ash. The southern portion of the chamber was filled with a loose soil containing humus and sand.

Upon removing the soil filling out of the chamber, stone stelae were exposed. The stelae were standing in two lines. Stelae 1 and 2 together with a stone remnant (of a broken stela?) formed a line stretching north – south and facing east. Stelae 3 – 5 formed a line stretching northwest – southeast and facing northeast. A blue glass bead (see Fig. 3, *5*) was recovered from a depth of (+24)* near stela 4.

The floor of the chamber revealed a vague whitish spot in front of stelae 3 – 5 at a depth of (+5). It represents the outlines of a pit of irregular trapezoid shape elongated along the north-northwest – south-southeast line. The dimensions of the pit are 1.3 × 1.7 m, its depth is 0.5 – 0.6 m. The western and eastern walls of the pit were slightly dipping, the southern wall was nearly vertical,

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* All osteological identifications referred to in this paper were carried out by T.N Nurumov.

* A zero datum was established at the lowermost point on the profile wall

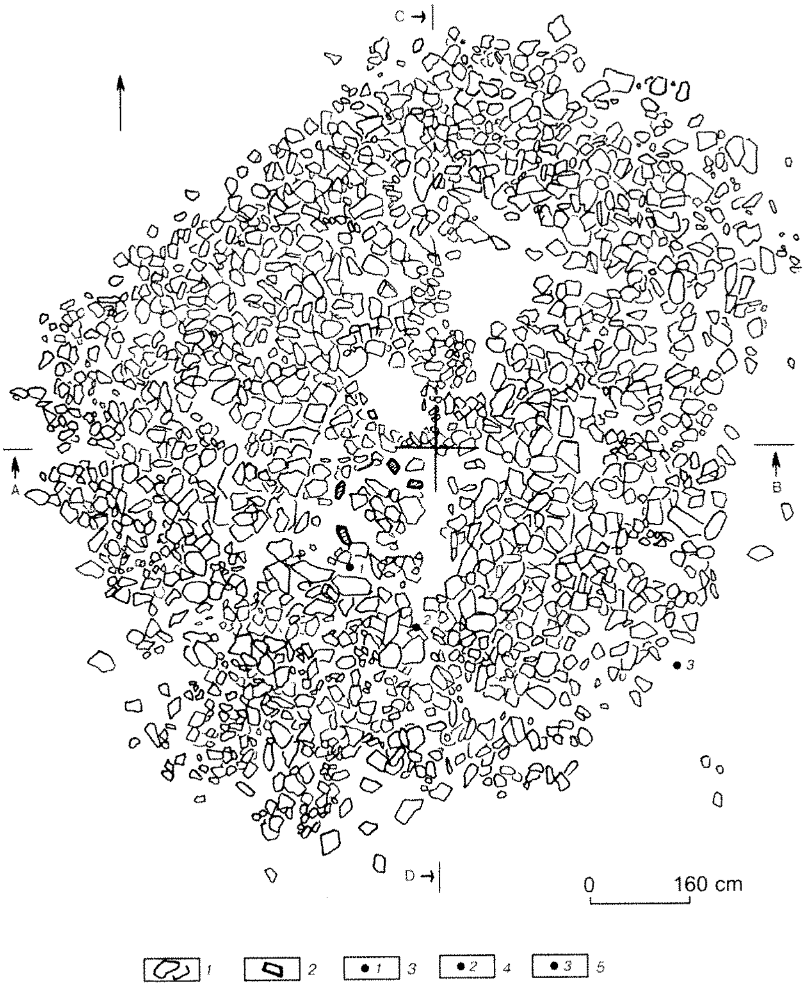

Fig. 2. Plan of the Zhinishke ritual construction after sod removal.
1 – stones; *2* – stelae; *3* – stone spindle whorl; *4* – ceramic fragment; *5* – iron nail.

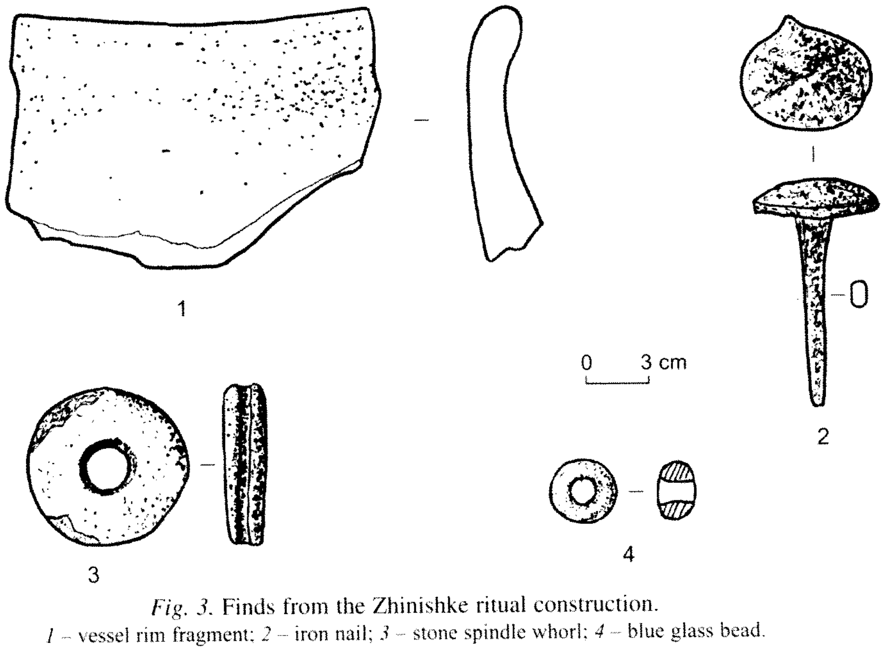

Fig. 3. Finds from the Zhinishke ritual construction.
1 – vessel rim fragment; *2* – iron nail; *3* – stone spindle whorl; *4* – blue glass bead.

and the northern wall was gently sloping. The pit was filled with light brown soil containing charcoal pieces, rotten wood dust and solitary stones. The upper portion of the pit filling yielded fragments of large bones of a young horse (distal end of a femur and a canon-bone) and pieces of rotten wood. A thin lamination of soot was traced on the floor of the pit. The pit was dug out upon making a gate in the northeastern wall; this is suggested by the fact that the northern boundaries of the pit went beyond a presumed inner border of the enclosure. Both the pit and the gate testify to the secondary usage of this ritual construction.

Initially, the construction consisted of the closed enclosure surrounding carved stelae. It seems that the enclosure was erected on an intentionally leveled surface on an embankment. The inner chamber was filled up soon after construction (otherwise, painting would not have been preserved on stela 2). The enclosure was covered over with earth; the remains of this cover may be seen on profile walls (Fig. 6). The enclosure was surrounded by a small ditch, also visible on the profile walls. The floor of the excavation section also revealed traces of a ditch about 1 m wide located about 2 m from the enclosure. No ditch traces were noted in the northern and southeastern portions of the excavation area*.

Stone stelae apparently constituted a central component of the whole construction. Below we provide descriptions of each stela.

Stela 1 (Fig. 7, *1*). A granite stela (174 × (35 – 38) × (16 – 20) cm) represents a human image with its hands down. Facial features are stylized. The eyebrows and the nose are depicted by a continuous band in high relief. The eyebrows are so long that their ends nearly reach the corners of the mouth. The outline of the nose is protruding onto the forehead over the eyebrows. The mouth is shown by a hollow. The shape of the head is reminiscent of a sharp-pointed hat. A band in high relief descends from the left shoulder to the breast of the figure. Hands are shown in high relief, but the fingers are not accentuated. A band in high relief goes horizontally 30 cm below the hands. The abdomen is prominent; it is especially notable from the side view of the figure.

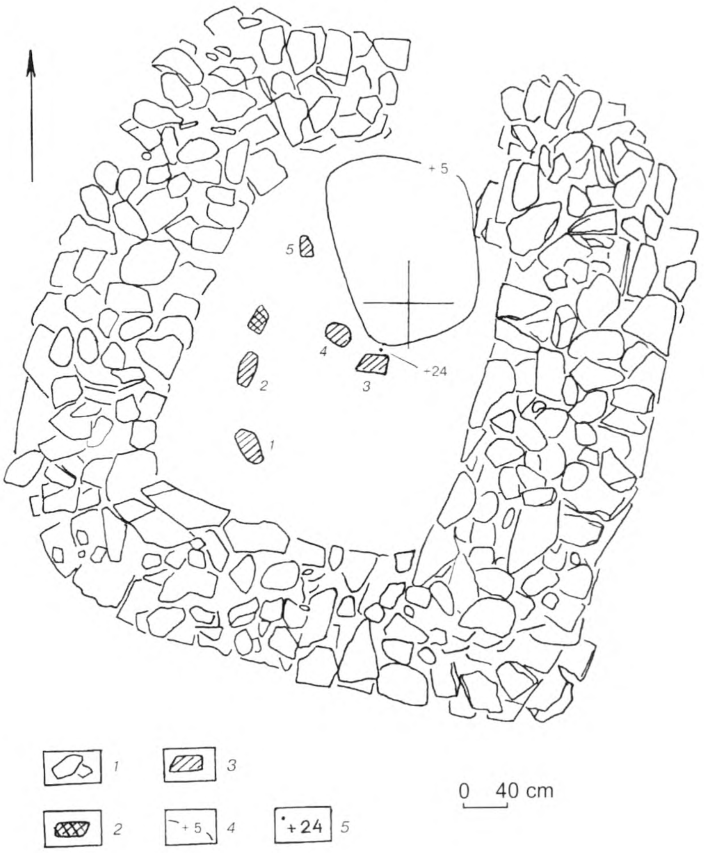

Fig. 4. Plan of the enclosure with stelae at Zhinishke.
1 – stones; *2* – stelae; *3* – broken stela; *4* – outlines of the sacrificial pit; *5* – glass bead.

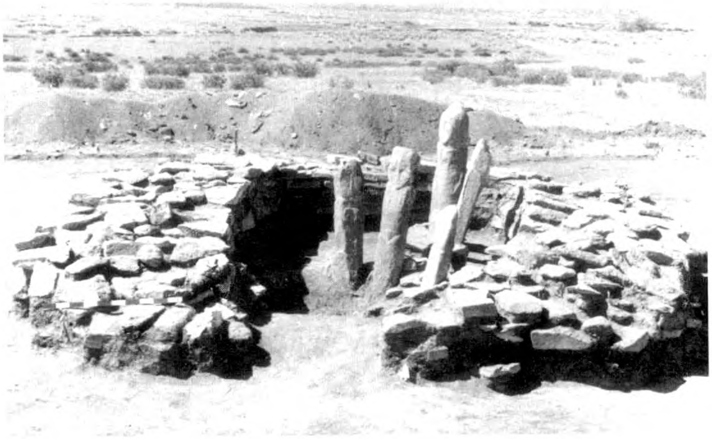

Fig. 5. The Zhinishke ritual construction. A north-northeastern view.

Stela 2 (Fig. 7, *2*). A granite stela (143 × 25 × 20 cm) portrays a human figure holding a vessel in front of his abdomen. The facial features are stylized. Eyebrows form a continuous line in high relief with the nose. The eyes and the mouth are shown by small oviform hollows; the high Asian cheek-bones are shown in high relief.

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* It cannot be excluded that the remains of the ditch were destroyed in the course of the reformation of the whole construction. The southeastern traces of the ditch may have vanished due to bush vegetation.

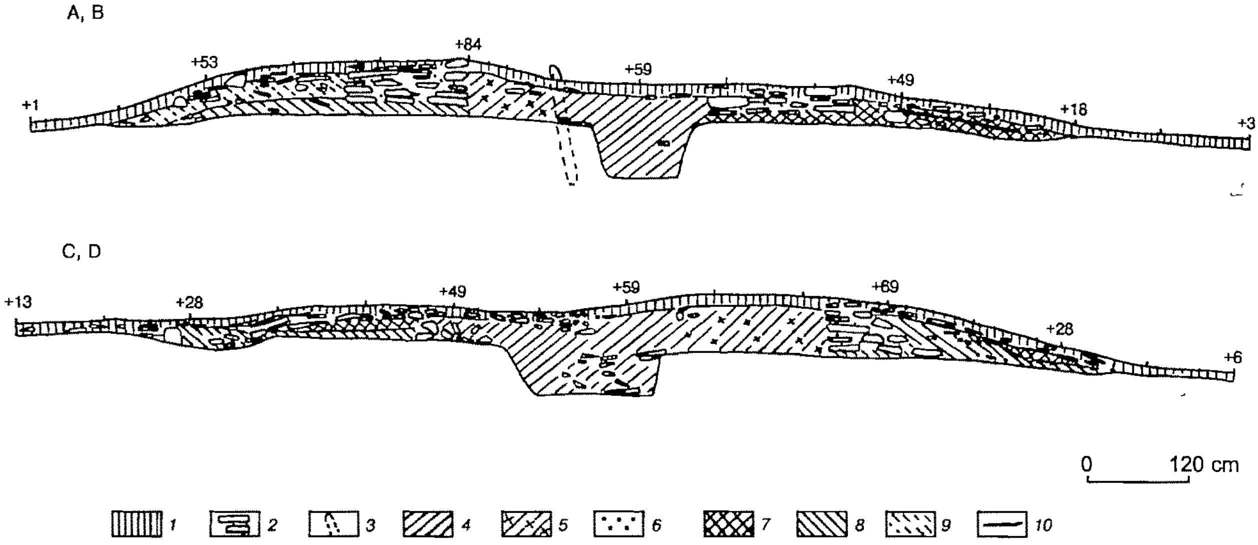

Fig. 6. Stratigraphic profiles of the Zhinishke site.
1 – sod, *2* – stones, *3* – stela, *4* – mixed sediments (light brown with gray and dark gray colors), *5* – soft mixed sediments, *6* – grayish-brown filling between stones, *7* – dark gray lamination, *8* – grayish-brown artificial layer, *9* – light gray anthropogenic layer, *10* – black lamination

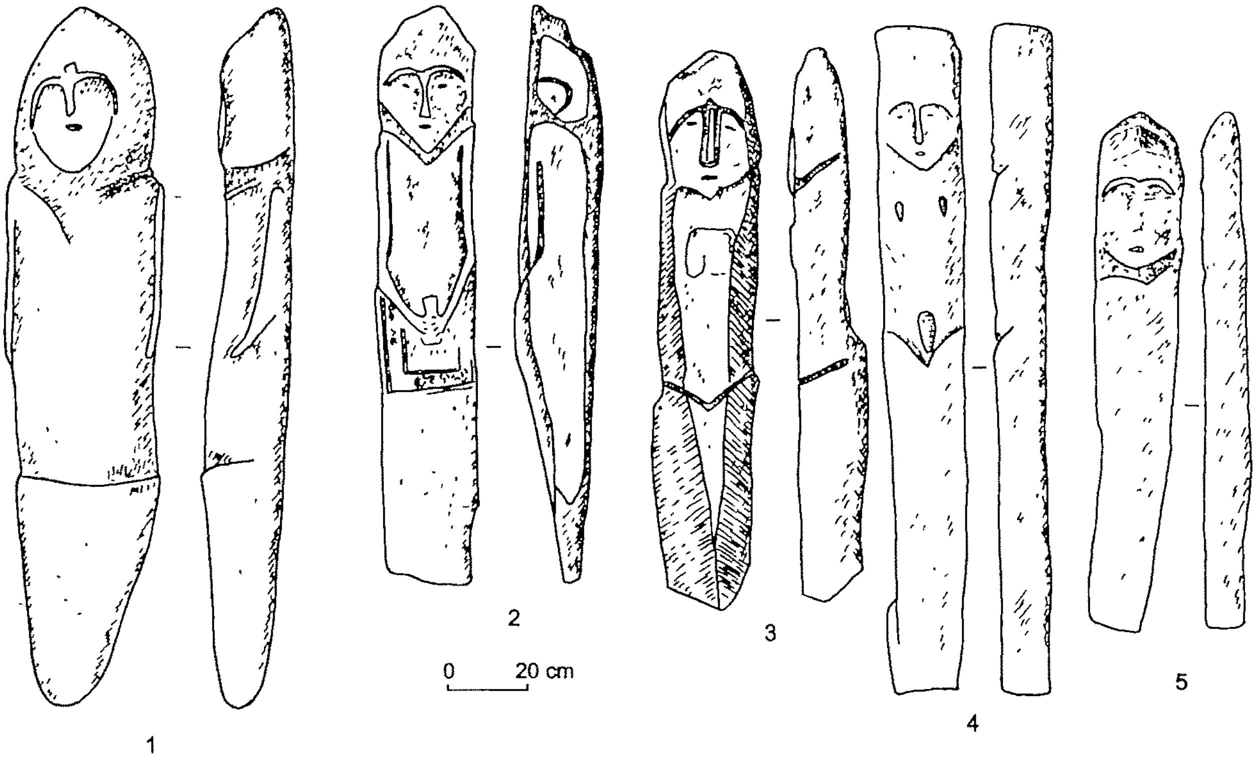

Fig. 7. Stelae from the Zhinishke site.
1 – stela 1; *2* – stela 2, *3* – stela 3, *4* – stela 4; *5* – stela 5

The high tip of the head is shaped with rough flaking. The hands and the vessel on the frontal surface are shown in high relief. Fingers' outlines can be traced on the body of the vessel. An apron is painted with black, yellow, and red paint below the hands and the vessel. The apron shows a volute pattern (Fig. 8). The lateral surfaces of this stela display the outlines of ears (the left ear with a dot in the center) and arms; these features were executed through pecking.

Stela 3 (Fig. 7, *3*). This stela (146 × 27 × (15 – 19) cm) represents a granite slab trapezoid in cross-section. The facial features are shown in a stylized manner; features of female sex are accentuated. The eyebrows and the nose display the design similar to that of stela 1; these features were incised. Narrow incisions symbolize the eyes and the mouth. The high pointed tip of the head was formed by rough flaking. The upper portion of the body shows a natural protruding part reminiscent of a female breast. The lower border of the abdomen is shown by an incised line accentuating legs and groin. A natural protrusion at the backside of the stela represents buttocks.

Stela 4 (Fig. 7, *4*). This granite stela (176 × 23 × (13 – 16) cm) shows a head and female gender features on the body. The face is stylized. The upper portion of the head, reaching the eyebrows, protrudes over the rest of the face. The nose is shaped in high relief. The lips and the lower outline of the face are also shown in bas-relief. The narrow hollows on the face represent the eyes. The upper part of the head is high and rectangular. Two drop-shaped protrusions on the body represent female breasts, female genitals are also shown. An incised line below the genitals depicts legs and groin.

Stela 5 (Fig. 7, *5*). This granite stela (137 × 23 × 12 cm) bears an image of a human face with stylized facial features. The eyebrows and the nose are shown in high relief. A small hollow depicts the mouth. The upper portion of the head is high and two-sided. The lower portion of the face is outlined by a groove.

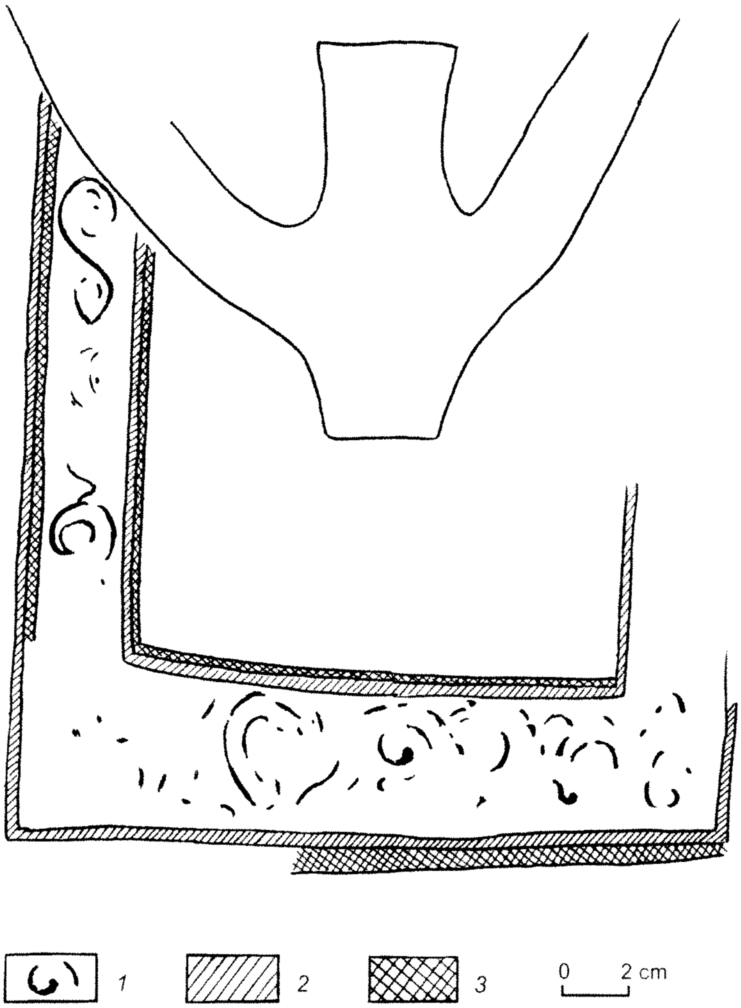

Fig. 8. Detail of the painted apron on stela 2.
1 – red, *2* – black; *3* – yellow.

The noted features of the ritual construction on the Zhinishke suggest its attribution to the Kypchak sanctuary, type 1. The typical construction of such sanctuaries represents a "barrow" with a massive stone enclosure surrounding stone stelae enclosed in an earthen pile (Ermolenko, 1991: 13). Kypchak sanctuaries, type 1, demonstrate many features in common with the Polovetski sanctuaries from the Lower Don (Gurkin, 1987). In the latter, wooden* (rarely stone) figurines were put into a deep pit dug out in a barrow remaining from a previous time. The pit was covered with earth together with the figurine (or figurines) so that it became hidden under a pile of earth pile**.

The Zhinishke stelae have been attributed to the Kypchak cultural type, which was widely dispersed over the territory of northwestern Central Asia during the 9th – 13th centuries. The noted iconographic features, especially the characteristic poses, support this attribution (Ermolenko, 1991: 12). Moreover, stelae portraying human beings holding a vessel (stela 2) were found together with stelae on which no pose is specified in a single sanctuary (Ermolenko, Kurmankulov, 1992: 119). Stelae in the pose noted on stela 1 (with the hands down), are also reported, though rarely, from the Kypchak figurines (Arslanova, Charikov, 1974: fig. 5, *14(2)*; Charikov, 1980b: fig. 2, *5*)*.

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* A Kypchak sanctuary, type 2, located in Central Kazakhstan, revealed small pits remaining from wooden objects. Beisenov and Korzhakov (2001: 162 – 163) hypothesized that these objects represented wooden carved figurines.

** A small ditch surrounding the ritual construction is one more common feature noted at the Zhinishke sanctuary and Polovetski sanctuaries from the Lower Don.

Depiction of gender features (e.g., stelae 3 and 4) represents another typical characteristic of the Kypchak figurines (Ermolenko, 1991: 15). Stylized facial features of stelae 1 – 5 are also executed in the typical Kypchak artistic manner (Ibid.: 10 – 11). Vessel depictions analogous to the vessel on stela 2 have been reported from the Kypchak sculptures in Southern and Central Kazakhstan (Sher, 1966: plate XXVI, *124*; Charikov, 1980a: fig. 3, *8*). The noted design of the upper portions of the heads in stelae 1 – 5 resembling a non-specified headgear is also typical of Kypchak art (Charikov, 1979: fig. 6, 7).

The sculptures described here lack detailed elaboration of the whole figure, as is typical of Kypchak art in general. Major attention was paid to elaboration of the face. The sculptures were fashioned on tetrahedral stone slabs resembling human figures. The natural stone surface was treated only on the faces and body (few features). The backside of such stelae were usually not treated the same as the lateral sides. The general impression is that an original monolith was perceived as an idol, and certain features were added in order to reveal its characteristics. All the named features help to attest the Kupchak figurines to traditional sculpture.

Of all the figurines uncovered at Zhinishke, only the painted sculpture is unusual. A drawn and painted apron represents an original detail of attire. A similar non-ornamented apron (?) was uncovered from the Kypchak sanctuary at Sandyk (Novgorodova, 1989: plate VII, *22*). The volute pattern, similar to that noted on stela 2, has been recorded from one of the Polovetski figurines (Pletneva, 1974: plate 81, *1291*).

The stelae from the Zhinishke sanctuary and the original appearance of Kypchak figurines

Remnants of paint on stela 2 suggest the idea that the sculptures under discussion (and Kypchak figurines in general) may have originally looked differently. Thus we are faced with the problem of reconstruction of the possible original appearance of any ancient anthropomorphic image. The idea was first formulated in the mid-1960s by M.P. Griaznov (1964). He wrote about the Tripolye figurines:

> Archaeologists used to forget that they got hold of ancient things not in their original state. We usually deal with that part of an object that has not perished. But we usually forget about that and don't even try to reconstruct the original appearance of the object and add missing features (Ibid.: 73).

Depictions of attire have been preserved in the lower part of stela 2 due to the fact that the figurine was covered with earth. However, the rest of the stelae of this sanctuary did not bear any traces of paint on their surfaces. It is explainable by the fact that stelae 3 – 5 were exposed to air over a considerable period of time in the renewed sanctuary (the sacrificial pit was dug out immediately near the stelae). The case is different with stela 1. If its lower part was painted, remains of paint may be preserved. However, stela 1, like stela 2, produced an impression of a dressed human, because of the presence of a non-detailed headgear. Both stelae bear depictions of hands, suggesting the presence of clothing. This assumption is supported by the apron on stela 2. A fragment of a band in high relief and a transversal protrusion on the frontal face of stela 1 seem to mark the upper and lower edges of an unspecified dress, the cut of which is hardly detectable.

The question arises as to whether the clothes of stela 1 were deprived of any shape, details, or color, and whether the Kypchak sculptures were monochromic (achromatic) We think that monochromic plastic images are more characteristic of modern art than ancient, since modern art requires an abstract perception of an object, apart from its color characteristics. Humans apprehend the surrounding world in color, so it is natural for them to create colorful things. Ancient people perceived color as a feature concurrent to an object. This inference is based on the examples of preserved specimens of colorful sculptures from ancient civilizations, e.g., Egyptian, Greek, Roman, Indian, Chinese art and others. It's quite another matter that many ancient sculptures that have survived to the present have lost their coloration. Ancient sculptures in such colorless form were taken as classical patterns for Renaissance art, and possibly also the contemporary art of monochromic sculpture. A.F. Losev (1974: 416) argued that appearance of modern achromatic sculpture apparently resulted from the *new European fashion of representing matter as an abstract and colorless thing* (italics by **L.E.**). It is noteworthy that contemporary religious sculptures are sometimes colored in the same way as the traditional figurines were. After all, religious and traditional objects do not represent abstract images, but creatures of an ideal world.

The provided data seem to reinforce our doubt that the clothing of the human figure portrayed on stela 1 was "colorless" though not painted. It is known that in antiquity, clothes were sometimes made of materials other than that of the main image. For instance, Zeus of Olympia by Phydius was made of ivory, while his clothes were made of gold. During Roman times, statues were dressed in clothes made of bronze or gilded bronze, or else an attire made of gemstones (Ibid.:402). Drapery was also used. Greek women from Panaphyneus ritually gave Athena a peplos. N. Braginskaya (1979: 24) believed that this custom of giving gifts to the ancient idol representing this goddess survived from the time when the idol was dressed in new attire on holidays*. On days of triumph, the statue of Mercury at the Bull's Forum was dressed in the attire of the triumphant (Ibid.) Acrolyphs in ancient Greece, wooden statues with legs and arms made of stone, seem to wear clothes as well. Vases from Attica depict scenes of dressing an archaic "statue" of Dionysus (Akimova, Kifishin, 1994: 197, ill 24). "This is not a full statue of an anthropomorphic god, only a mask is hung on a pole; in some cases, two masks looking in opposite directions as Janus, and attire banded around the pole imitating a body is depicted with no legs or hands ..." (Burkert, 1972: 260).

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* A stela discovered in the piedmonts of the Koktau, Dzhetysu, displays a similar position of the hands, and the body bears a picked out depiction of a vessel (Charikov, 1980b fig. 2, *12*).

N. Braginskaya speculated on the topic of dressing up ancient statues.

> It should be noted that ancient statues all wore costumes. The contemporary viewer is used to admiring the statuary beauty of ancient torsos. Special effort should be taken, however, in order to imagine that many statues, including some well-known pieces of art and statues in temples, represented dolls to be covered with dress, and the work of the sculptor was not exposed (1979: 24)**.

Contemporary habits of dressing cult statues have been recorded from Mongolian monasteries, from the pagoda-temple Muktinatkh in Nepal, etc. Clothes made of real fabric constitute a typical characteristic feature of traditional sculpture. Any object of traditional anthropomorphic sculpture represents a doll as it consists of a "body" and clothes. The body needs to be dressed up in its material covering, clothes; without it the body would not be regarded as existing (Lévi-Bruhl, 1994: 258)***.

Traditional sculpture provides us with numerous examples of dressing up images with specially made clothes or with symbolic covering or wrapping in cloths, fur, etc. (Ivanov, 1970: 283, fig 8; 9; 10, 2; 28; 37; 58; 66; 144; 120; 152, etc ; 1979: fig. 22, 34, 82, 152, 158, etc.; Gemuev, Sagalayev, 1986: fig. 25, 26, 30, etc.). S.V. Ivanov (1979: 159) regarded this phenomenon as a representation of a "primitive naturalism." S.I. Weinstein (1974: 37, 39) pointed to "unexpectedly vivid analogues" of traditional Siberian sculpture to the Kokel wooden figurines of the Hunnic-Sarmatian period preserving remains of clothes and shoes.

The above-mentioned data allow us to infer that stela 1 might wear some sort of dress (cf., e.g., (Ermolenko, 1991: 5; 1994: 157, 163, commentary 3)) in the same way as the wooden figurines from the Polovetski sanctuaries, two of which revealed remains of textile (Gurkin, 1987: 108). Figurines bearing textile remains (from burial mound 12 of the Novy Aksai and from burial mound 7 of the Tuzluk cemeteries) portray humans holding vessels in both hands. It cannot be excluded that details of figurines were hardly discernable under the textile covering *.

Some researchers have surmised the existence of a tradition of dressing up schematic stone statues by ancient Turks. L.R. Kyzlasov (1964: 350) argued that ancient Turks, during the ceremony of funeral repast, used to dress a stela (or a schematic figurine) located immediately to the east of the burial enclosure with the clothes of the deceased. G.A. Federov-Davydov (1976: 92) shared this point of view: "A primitive stone figurine with vague anthropomorphic features and schematically engraved face deputized for the deceased and was treated as an actual person: it was dressed, fed, and provided with drink."

It is noteworthy that ancient stone figurines that have contemporarily renewed their status as objects of worship are dressed in accordance with the traditional perception of an anthropomorphic image. In 1881, A.V. Andrianov examined a "Gengiz Khan" figurine in Tuva and wrote that the figurine was dressed in a hat and a muslin shirt (Devlet, 1990: 47)**.

V.E. Voitov (1987: 107, commentary 15) reported a figurine from Ungetu, Mongolia, wearing a considerably faded blue vest and a band with attached strips of cloth, metal objects, and locks of horsehair around its neck. The vest was put on over the arms folded at the breast. Another figurine representing Dayan Derkhe, a mythical shaman or hero, existed in Divadjin-gazar, Mongolia, until the late 1920s. Local people described it as a stone of an average human height wrapped in silk (Galdanova, Zhukowskaya, Ochirova, 1987: 54). A similar tradition has been reported from the Nganasan people, who worshiped *koika,* stones resembling a human figure. *Koika* stones were dressed in skins of domesticated deer, a new skin being provided every three years (Gracheva, 1977: 220)

We also believe that stela 2 was wearing some sort of clothing. Apparently, the rough shape of the upper part of its head was the base for real headgear, rather than a painted hat. Such a combination of real clothing with painted dresses was also reported from the Gengiz Khan figurine by Andrianov. Its cap bore a "circle and mask" pattern in red paint; ribs were shown on the shirt. Besides, "the whole statue was painted white, but its moustache, eyebrows, and eyes were painted black, its lips and cheeks covered with gold; the breast showed a hollow at the neck, and the nipples and breasts themselves were outlined in red paint" (cited in (Devlet, 1990: 47)). After a century, the paint had faded and in 1977 M.A. Devlet managed to notice only "vague outlines in red paint." (Ibid.: 48)

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* Cf: "belongings" of Siberian indigenous peoples In Khantic folklore, the spirit of a house protectoress becomes angry because dresses sewn for her do not fit (Novik, 1994: 147).

** N. Braginskaya stressed that statues were treated as living creatures People "washed them, put makeup on them, dressed, decorated them with flowers, and put fragrance on them (incense – L.E.) (Braginskaya, 1979. 24)

*** Cf. Clothes were given particular attention in Russian folklore "A naked body is a dead body" (Byliny . . , 1988: 66)

* Cf · Buddhist figurines and contemporary Mongol statues wrapped in textile clothes (Jisl, 1960 Abb. 28, 52)

**A V Andrianov did not mention hands or vessels that were likely hidden by clothing

Unlike stelae 1 and 2, arms and hands are not shown on stelae 3 and 4. The torsos reveal features of female gender. However, their heads suggest the presence of headgear. Stela 3 demonstrates a generalized pointed cap, while stela 4 shows a high cap with a flat top. Presumably we encounter the stelae in their original form, portraying naked women without arms, but wearing caps. On the contrary, we believe that the fact that figurines show gender features and have no arms is suggestive of their being "dolls," whose arms might have been shown by the sleeves of their dresses. M.P. Griaznov (1964: 77) also argued that the Tripolye statuettes, naked anthropomorphic figurines without arms, represented a sort of blanks or dolls that were dressed up in the ancient past. He based his arguments on two major points: (1) ancient people made anthropomorphic figurines in the image and likeness of human beings, usually dressed up, as real people, with clothing common in the everyday life of the given nation or tribe or that had been used by these people long before (Ibid.: 72); and (2) these images may have partly consisted of perishable materials (Ibid.: 74).

The Polovetski statues may serve as an indirect testimony in favor of our supposition about dressing Kypchak figurines with specified gender features. The Polovetski figurines bear both specified gender features and details of clothing. N.I. Veselovski wrote: "A naïve master meant to stress the gender of a statuette by showing female breasts rather than by showing a naked human body" (1915: 29)*. Depiction of both gender features and details of a costume seems to be important for Polovetski artisans. So they tried to do it on one and the same rock surface with the aid of engraving, raised relief, and probably painting.

Realistic Polovetski stone stelae display many details. This feature allows us to assume that certain details were marked by color (painting or covering with metal leaf). S.A. Pletneva (1974: 58) also believed that at least some Polovetski figurines were painted. V.D. Kubarev argued that the most sophisticated statues of ancient Turks also might have been painted:

The profoundly realistic figurines in the Altai, Tuva, and Mongolia were made on limestone or white marble. Outlines of objects are hardly visible on the white background. They might have been painted in antiquity showing the rich coloration of the costume of noble Turks. The colors may easily be reconstructed on the basis of available images of the Turks and Sogdians on the frescos of Pedjikent and Afrasiabe (1984: 82).

Kubarev quoted a story by Kalkin, a narrator of folk tales from the Altai, about a stone stela that he had seen in the taiga portraying a warrior "girded with a golden belt" (cf.: golden coating on "Gingiz Khan's" cheeks and lips) A red bag (or a leather vessel) was shown at one side of the figurine, and a sword in a golden sheath was shown at the other side. Kubarev thinks that Kalkin's story may reflect "real information on an ancient habit of painting stone stelae" (Ibid.: 83). We may add that this story illustrates a traditional perception of anthropomorphic images, colorful beyond doubt.

Summing up, stelae 1 – 4 seem to have been dressed (stela 2 may have been partly dressed). The same assumption may be made concerning stela 5. It fits the description of a doll perfectly. Only facial features are shown; the upper part of its head was shaped as a headgear. The remaining part of this stela seems to symbolize a human body and represents a prop for clothing. In all appearances, faces of stelae 1 – 5 might also have been colored.

Conclusion

The cult construction on the Zhinishke is defined as a Kypchak sanctuary, type 1, with stone stelae covered in an earthen mound. The noted iconographic features allow their attribution to the Kypchak culture (AD 9th – 13th centuries). The Kypchak sanctuaries were hardly, if ever, in use for a long time in an unearthed state, as were the analogous Polovetski cult places (Gurkin, 1987: 107; Ermolenko, 1994: 158 – 159). L.N. Ermolenko assumed that the ritual of covering stelae with earthen mounds symbolized the myth of the birth of an ancestor in a mountain/tree. A similar myth existed in the Medieval Uigurian folklore. It served as a basis for the legend of the birth of Kypchak recorded by Rashid-ad-din (Ermolenko, 1994: 160 – 163). It is noteworthy that the topographic layout of the Zhinishke sanctuary erected at the confluence of two rivers fits with the myth. The change of the sanctuary construction during its secondary use was aimed at providing free access to the three stelae for the sake of worship. A portion of the wall adjoining the stelae was disassembled, and a sacrificial pit was dug out immediately in front of them.

The painted stela 2 from the intact portion of the sanctuary supports the existing hypothesis that medieval nomads' statues may have been painted. Analysis of the artistic features of stela 2 and other stelae of this particular sanctuary allows us to conclude that they wore real clothing Medieval nomads' figurines, possessing many common features with traditional sculpture, obviously were not and could not be achromatic images due to the unsophisticated perception of such figurines by their creators. Future excavations of Kypchak sanctuaries with stelae covered in earthen barrows will probably provide researchers with new data for the reconstruction of the original appearance of these sculptures.

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* Cf.: A depiction of a breast and ribs on the shirt put on the stela of Gingiz Khan

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ANCIENT MINING AND METALLURGIC PRODUCTION ON THE BORDER BETWEEN EUROPE AND ASIA: THE KARGALY CENTER

Introduction

The ancient Kargaly copper ore mining and metallurgic center in the Southern Urals (Fig. 1) presents a massive and, beyond doubt, unique complex. This becomes absolutely clear when it is compared with neighboring and distant ancient mining centers scattered over a vast territory of the northern part of the Eurasian continent. The phenomenon of the Kargaly complex is conditioned by a combination of striking features; let's mention here just the most important of them*:

– extremely large area of mineralization, making in total up to 500 sq. km; geologically the Kargaly belongs in the category of vast ore fields;

– practically all the surface exposures of ores or ore bodies of comparatively shallow occurrences were discovered early in ancient times; the discovery of the Kargal ores and their active development date to the 4th millennium BC or even to the boundary between the 4th and 3rd millennia (Early Bronze Age); the development reached its climax in the Late Bronze Age (2nd millennium BC);

– an enormous amount of ancient and recent mining activities: the number of various traces from this kind of work (only surface) exceeds 30 thousand;

– the total length of mines most probably amounts to many hundred kilometers;

– the maximum depth of mines and horizontal drift in the Bronze Age reached 40 – 42 m, while in the 18th – 19th centuries it reached 80 – 90 m;

– the total volume of extracted sandstone, marl and other kinds of rock is estimated at approximately 100 – 120 million m^3 or up to 250 million tons;

– the Kargaly is extremely rich in archaeological monuments; at present the following sites are known: (1) up to two dozen settlements dating to the 2nd millennium BC (Late Bronze Age); (2) four mound necropolises where burials from the Early and Late Bronze Age have been studied, plus several isolated mounds (kurgans); (3) monuments reflecting the first steps the Russian copper and copper-melting industry (18th century);

– the scale of copper ore extraction in the Bronze Age was surprisingly large, although the total amount of extracted copper minerals ranges within rather broad limits from 2.5 to 5 million tons;

– a large amount of smelted copper, with its total weight varying over a broad range, from 55 – 60 to 100 – 120 thousand tons;

– in the Bronze Age, Kargaly copper was distributed over vast territories of the East European steppes and forest steppes, with the maximum area of its spread reaching up to 1 million sq. km;

– in the 18th – 19th centuries the Kargaly complex was of prime importance for the development of Russia; on the eve of the 1773 – 1774 rebellion lead by Yemelian Pugachev, a quarter of all copper smelted in the Russian Empire was from the Kargaly ores; in the 19th century Kargaly copper was exported to West Europe, including such countries as England and France.

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* The Kargaly Expedition undertook a complex study of the center over a period of ten years (1990 – 1999) Over this period of time the expedition gathered a great variety of materials. According to the estimates made by the members of the expedition, a detailed description would take up about five volumes For this reason this article covers briefly only some of the most important aspects of the undertaken research.

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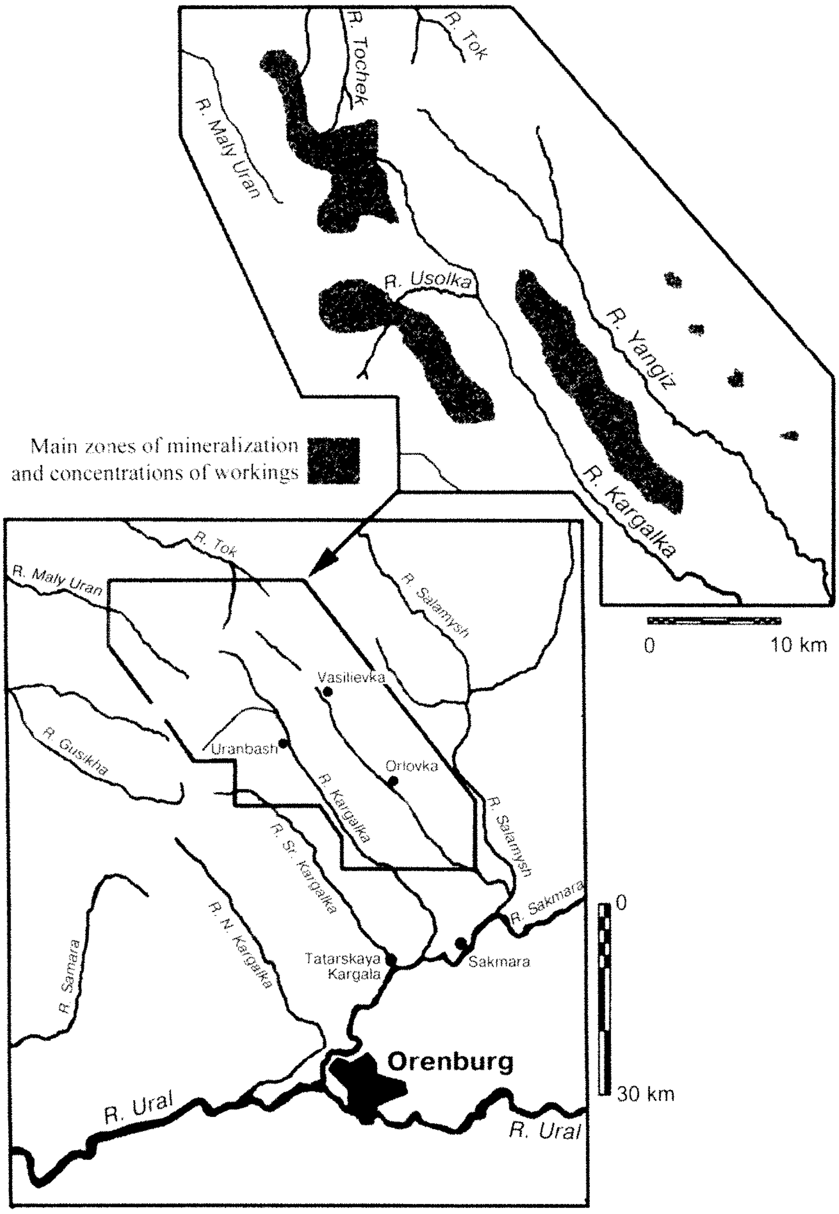

Fig. 1. Geographic position of the Kargaly mining and metallurgical center.

Location of the center

The Kargaly complex is situated in the Southern Urals within the administrative borders of the Orenburg administrative region of the Russian Federation. In effect this region, with hardly distinguishable landscape features, serves as the border between the European and Asian continents. The Kargaly is confined to the northern part of the Great Eurasian steppe and located in its mixed and feather grass zones (Geograficheský atlas..., 1999: 44, 45). The ore field is surrounded by a typical steppe landscape with rare floodplain patches of forest flora represented by alder, birch, aspen and willow. The closest large forests are situated 200 – 250 km to the northeast, represented by the mountainous and coniferous vegetation of the Southern Urals (taiga).

The Kargaly oval-shaped ore field stretches in the NW – SE direction, approximately covering an area of 50 × 10 km (Fig. 2). The geographic coordinates of circumferential points of spreading of the primary groups of mines are as follows: the northwestern edge of the ore field is situated at 52°16'186" N, 54°36'980"E (group I situated in the Volga River Basin); the southeastern edge is at 52°11'114" N, 55°14'848" E (group XII-h situated to the east of the Yangiz River in the Ural River Basin).

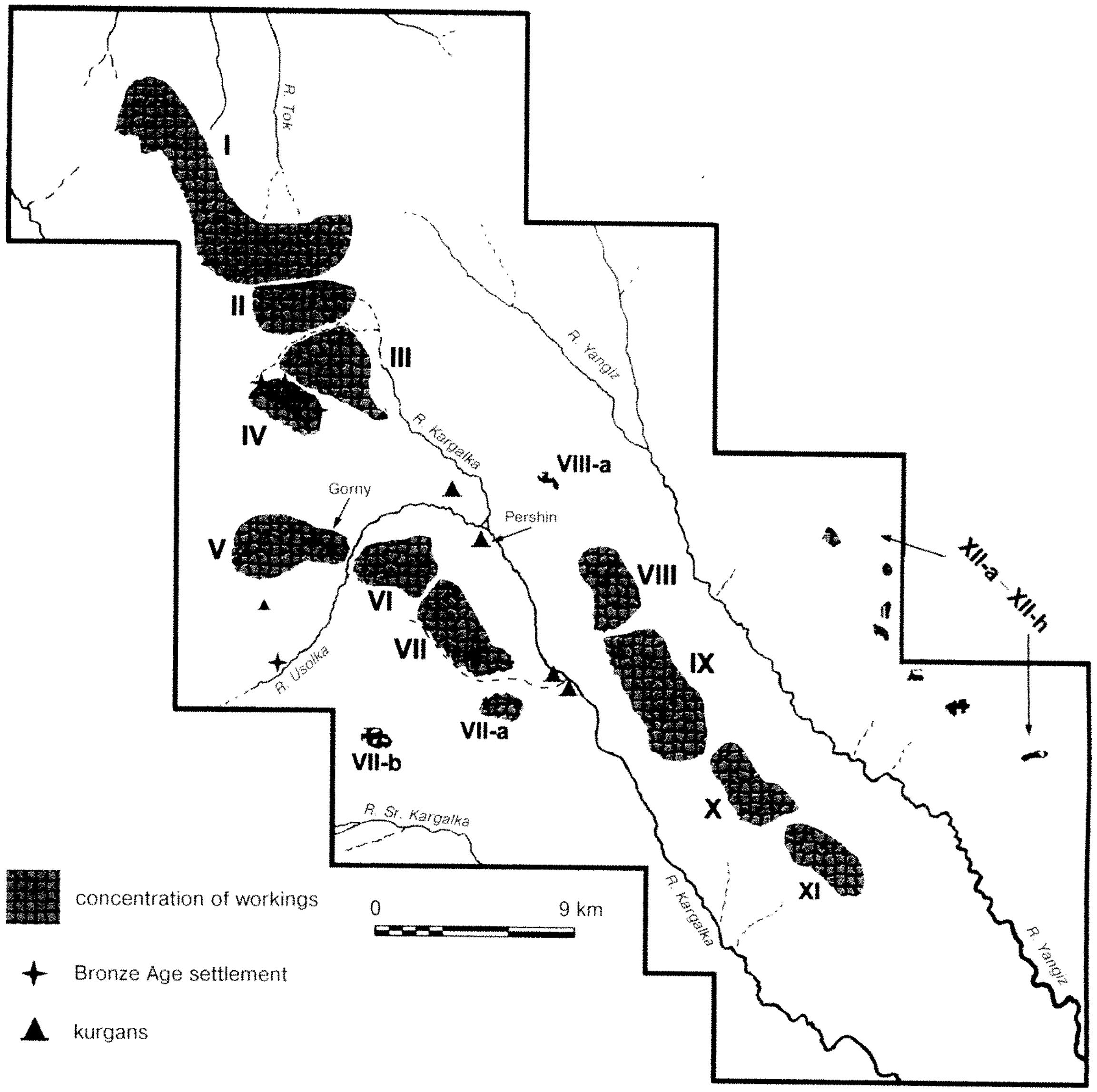

Fig. 2. Situational plan of the Kargaly center.

Rich copper mineralization appears predominantly in the Ural River Basin, mostly in its large right tributaries – the Sakmara and Salmysh rivers.

The most extensive copper ore exposures are associated with the right tributaries of the Sakmara and Salmysh rivers – the rivers of Kargalka and Yangiz (see Fig. 1). Copper ore mines are concentrated around the low-water steppe river Kargalka (the Upper Kargalka, to be more precise). It is from the name of this river that the name of the famous mine originates.

Mineralization and its nature

The Kargaly ore field belongs in the group of fields of sedimentary rock of copperbearing sandstone and shale types. These fields and small ore exposures stretch in a long and wide band of about 2000 km from north to south along the western periphery of the Urals fold zone; the Kargaly belongs to the southern group. Copperbearing sandstone of the Western Urals region is confined to the so-called Upper Permian red-color formation (Garyainov, Tverdokhlebov, 1964; Narkeluyn, Salikhov, Trubachyov, 1983; Luriye, 1988). Stratigraphically, the Ufimsk (the earliest), Kazan and Tatar geological stages are distinguished here; they are represented by a variety of sediments of continental and coastal marine genesis. Ore containing sediments are represented by cross-bedded sandstone and marl, often heavily saturated with remnants of fossilized trees of the Permian age.

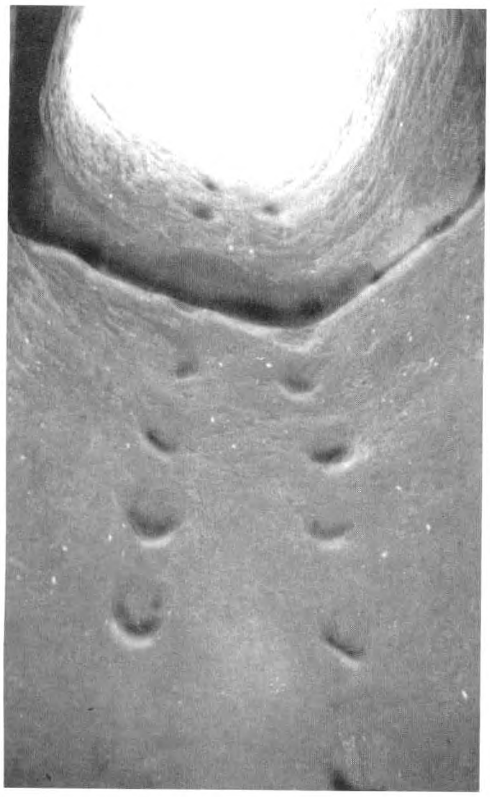

Fig. 3. Vertical mine shaft on the Myasnikovsky Plateau (area IV) with well-preserved stairs on the shaft's wall.

In Kargaly two main types of ores have been identified: (1) gray sandstone concentrating the bulk of copper minerals and (2) ore marl predominantly spread on the periphery of ore fields. The primary ore minerals are represented by sulphides, secondary copper carbonates, with the dominance of malachite as well as azurite, the content of which is considerably lower. Sulphide copper ore minerals (chalcopyrite, chalcocite, covellite) can only be distinguished under the microscope; they had no practical application.

It was in the Kargaly where the richest deposit of copper minerals was concentrated over the vast Western Urals zone of copperbearing sandstone. Ore minerals lay at different levels: from surface blows, noticeable on bare steep ravine slopes, to those at the 80 – 90 m level. Ore bodies present ore lens and "irregular" short and broken veins unsystematically scattered in the depth of ore containing sandstone and clay. Accumulations of ore minerals highly differ in size – from several centimeters to a dozen meters. The absence of system in the bedding of mineral lens resulted in an absence of system in the search for them by prospector-miners both in the Bronze Age and in the 18th – 19th centuries, as evidenced by innumerous disorderly traces left by prospecting activities at all the sites of the Kargaly ore field.

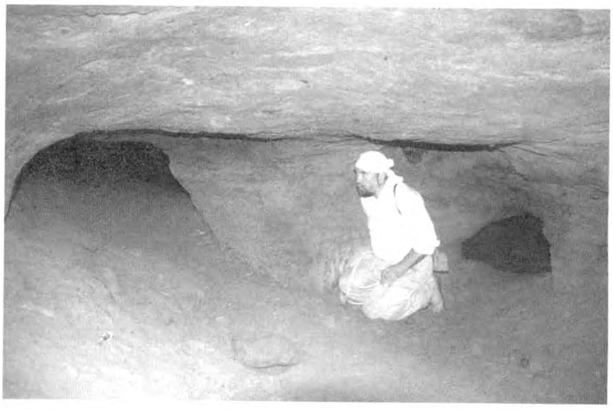

Fig. 4. Preserved underground workings.

Main types of mining objects

Shafts present vertical or close to vertical (with an inclination to 60°) workings in sandstone and marl as well as in the overlying clay (or sandy loam) surface cover, which were mined to reach the ore bodies (lenses or veins of copper minerals). Also, mines served to ventilate the underground workings and transport the minerals to the surface of the ground. By now only a very small number of objects have been preserved in their original state (Fig. 3); the majority of them are laced and filled with guttered clay sediments and detritus or covered with burrows resulted from previous mining.

Adits (galleries) present horizontal or close to horizontal (slightly slanted) workings in sandstone and marl. Shafts and adits are the most widely spread types of workings in the Kargaly. The shape of adits is, as a rule, rather quaint. It depended on the structure of ore containing rock as well as on different search features that were taken into consideration by miners in the course of surface and underground search for copper minerals. This is the reason why one type of working turned into another either gradually or quite abruptly, thus adits only rarely were distinguished by regular geometry of their section or clear direction (Fig. 4, 5, *b*). Since the Kargaly was dominated by so-called lens accumulation of copper minerals, adits could grow into enormous underground halls with very high arches, up to 20 m, from which other adits and galleries led in different directions. Among the shafts and adits surfacing to the ground it is often possible to find entrances to extremely large "transportation" galleries used for the transportation of the digging ore; such shafts and adits are distinguished by the presence of huge spoil heaps nearby.

Open casts present prospecting pits and quarries made in the surface clay "cover" in order to find

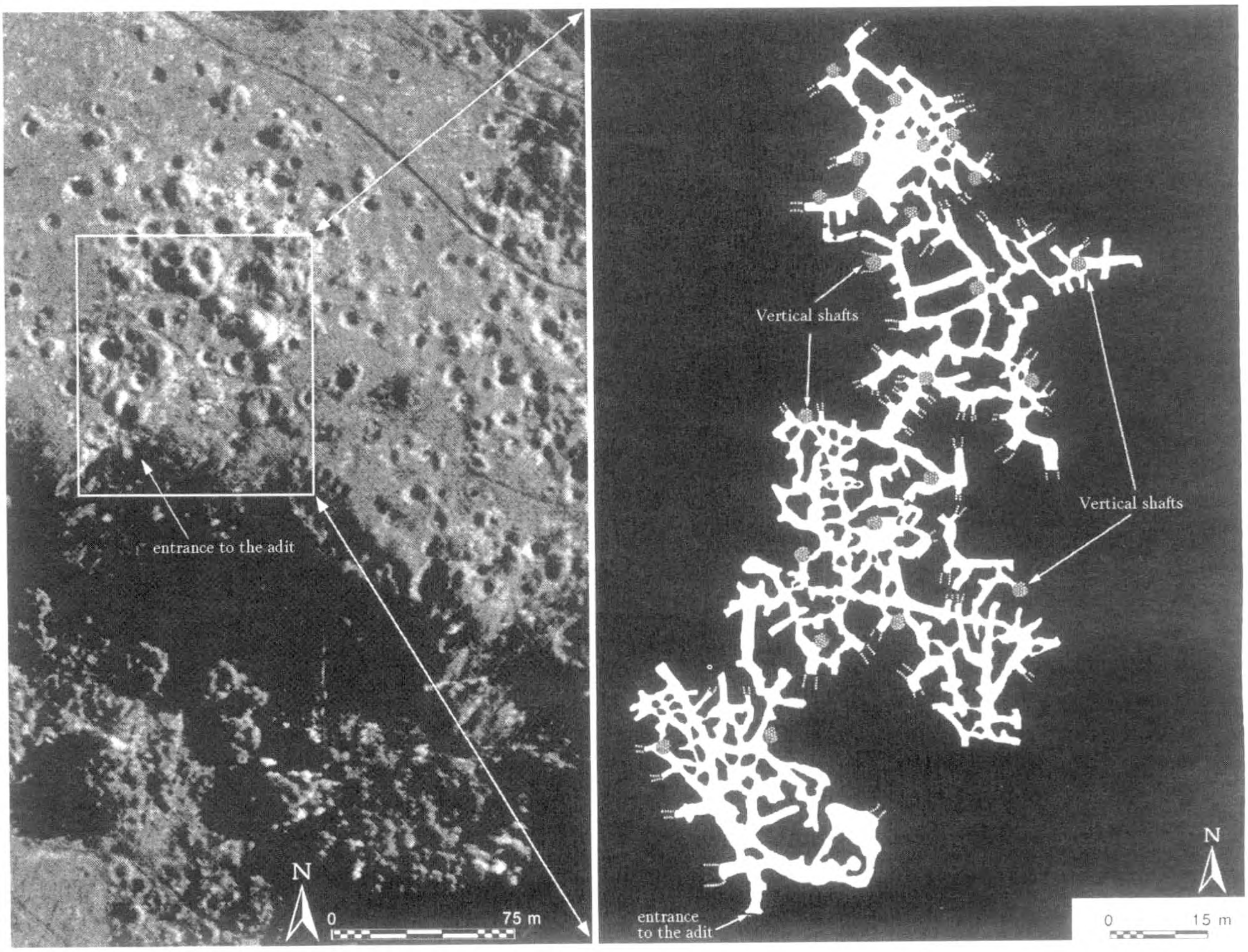

Fig. 5. Aerial photo of a part of surface traces on the Myasnikovsky Plateau (area IV) (*a*); the square with the labyrinth of underground workings is accentuated (*b*).

evidence of copper mineralization in the bedrock. They are often surrounded by spoil heaps composed of clay and sandstone.

Surface traces accompanying mining activities

Collapses of the roof occur over comparatively shallow, 5 to 15 m, horizontal or slanted gallery-like tunnels or large lenses forming underground workings similar to large galleries. Strictly speaking, sinks present just the traces of work formerly carried out here, thus it may be considered that they served as indicators of comparatively shallow workings invisible from the surface. Sinks may be from 2 to 3 to 50 to 70 m in diameter and from 1 to 20 to 25 m deep (Fig. 6).

It should also be mentioned that the Bronze Age workings on the one hand and mountain passages of the 18th – beginning of the 19th centuries on the other practically did not differ in form. Only in the second half of the 19th century geometrically regular mines and adits started to appear in the Kargaly; still they are quite rare here and lay at a considerable depth (50 to 80 m).

Rock disposals and dumps are the most typical and numerous traces left from mining. They are, as a rule, located by mine and adit entrances, but can also be situated at a considerable distance from them, covering the sides of ravines for hundreds and hundreds of meters (sometimes up to 1 km and more). When counting the traces of workings, no particular significance was attached to the heaps; they were treated as attendant traces of mines, adits and different kinds of pits.

Some features of the dumps shape and content make it possible to identify their relative ages and to refer them to the Bronze Age or the 18th – 19th centuries. The earliest rock disposals dating from the Bronze Age are, as a rule, represented by fine-grained ore containing deposits with relatively rich addition of malachite and azurite. Therefore very often the oldest pit tip resembles the places of so-called dry ore dressing, which they probably actually were. In the 18th century, attempts were made to extract malachite and azurite with high content of copper minerals from such ancient dumps.

Younger rock disposals significantly differ from the older ones. The former are very often represented by huge hills of large pieces of detritus such as sandstone blocks and plates. In comparison to the ancient dumps they are less rich in ore minerals. The appearance of such hills on the surface should probably be associated with relatively deeper workings that were characteristic of the 18th – 19th centuries.

The main zones of copper mineralization and concentration of workings

Three zones of rich copper mineralization can be clearly distinguished in the Kargaly: northwestern, central, and southeastern. In addition, to the east of Yangiz a fourth zone, peripheral or eastern, can be distinguished (of course, this zone looks much less impressive than the first three). A number of sites with higher or lower concentration of workings may be distinguished in each zone. In the Kargaly ore field a total of 11 primary sites and a number of peripheral sites have been marked. The latter are either adjacent to the primary sites or make up a net as is the case with the eastern peripheral zone (see Fig. 2).

Northwestern zone (A) is primarily connected with the upper riches of the Kargalka River (the Ural River Basin). It is represented by a concentration of four areas (I – IV) practically following each other. The total number of traces from workings ranges from 11,450 to 12,300.

Central zone (B) embraces both banks of the right tributary of the Kargalka – the Usolka River – and stretches to the right bank of the Kargalka in its middle flow. It incorporates numerous workings of three main areas (V – VIII) as well as two peripheral areas situated to the south of the primary one (VII-a, VII-b). The total number of surface traces of workings lies in the range between 10,650 and 11,600

Southeastern zone (C) is predominantly represented by copper mineralization and numerous workings located on watershed elevations (*syrts*) between the valleys of the Kargalka and the Yangiz. Four primary areas (VIII – XI) and one peripheral accumulation of workings are situated here (VIII-a). The total number of surface traces of workings lies in the range between 10,650 and 11,600.

Eastern peripheral zone (D) embraces the left bank watershed elevations east of the Yangiz River Valley and includes up to eight comparatively unimpressive areas of accumulations of both prehistoric and historic workings (XII-a – XII-h). The total number of surface traces of workings here decreases manifold – up to 1,200 – 1,400.

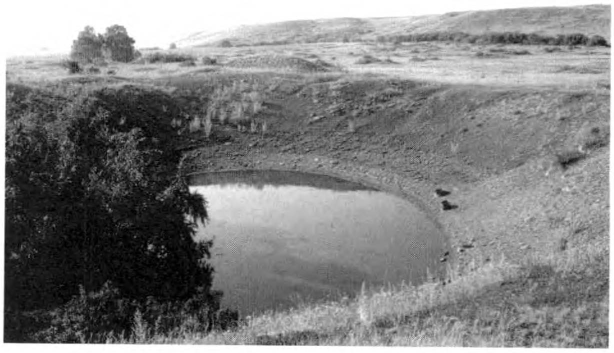

Fig. 6. Lake in a sink over a vast underground cavity (area V).

Workings: Quantity, area and linear extension

"Chaos" in different traces of workings in Kargal (see Fig. 5, *a*) cannot be very easily systematically analyzed. For this reason the calculations of surface traces almost always were more or less approximate and probabilistic in nature (Table 1). The calculation method based on decoding and scanning of the results of aerial photo-survey proved to be most effective. Visual observations could not be considered to be of importance by themselves; they were only occasionally used to specify a number of small details of the general picture.

The overwhelming majority of surface traces from workings (approximately 70%, or up to 23,000 – 24,000) are concentrated in northwestern (A) and central (B) zones, continuously following each other; about a fourth of them are situated in the southeastern zone (C). At the same time, slightly more than 4% of entrances to the ancient and recent mines and adits have been registered within the eastern peripheral zone (D). The total area of all the marked and relatively well-outlined sites, where about 34 thousand traces from workings referred to both prehistoric and historic periods are concentrated, can be estimated at 138 – 145 sq. km. The central zone has the highest density of concentration of surface traces from workings per 1 sq. km (290). But the leader is site IV, the southernmost accumulation of traces in the borders of the northwestern zone; here the number of workings has been established at the level of approximately 517 per 1 sq. km.

Table 1. Evaluation of quantities of surface traces of workings by areas and main zones as well as their sizes

Area	Zone	Minimum	Maximum	Size, sq. km	Average number of workings per sq. km
I	A	3200	3400	25 – 26	130
II		850	1000	7	143
III		4600	4800	17 – 18	267
IV		2800	3100	6	517
Subtotal		11.450	12.300	55 – 57	216
V	B	3900	4100	15 – 16	256
VI		2200	2400	8	300
VII		3800	4200	10 – 11	382
VII-a		650	750	3	250
VII-b		100	150	2	75
Subtotal		10.650	11.600	38 – 40	290
VIII (+VIII-a)	C	1500	1700	7	243
IX		3900	4100	17 – 18	228
X		2100	2300	7	329
XI		450	500	6	83
Subtotal		7950	8600	37 – 38	226
XII-a–h (Yangiz)	D	1200	1400	~8 – 10	140
Total in Kargaly		31.250	33.900	138 – 145	235

The total spread of underground workings in Kargal can only be estimated very roughly and approximately; most likely it may run in hundreds of kilometers. To take one example, over a rather limited area of approximately one hectare within the borders of area IV on the elevated plateau of Myasnikovskiy ravine (see Fig. 5, *a*) speleological surveying of comparatively well-preserved underground adits and galleries was carried out* (Fig. 5, *b*). The total length of workings only on one of the underground "floors" (the depth of 10 – 15 m) amounts to about 1.5 km. Since one hectare is a microscopically small value for the Kargaly ore field, it can be imagined what the length of all the underground workings was.

Periods of exploitation

Two large, though far from being equal, periods are distinguished in the exploitation history of the Kargaly mineral resources. One of the periods lasted for about 2000 years – from the second half of the 4th to the second half of the 2nd millennium BC. The other one was comparatively short; it lasted slightly more than 150 years: from 1744 – 1745 to the end of the 19th century. The nature and the essence of each of these periods may now be documented by a wealth of field, archaeological, and archival and literary (for the later period) materials.

These periods are separated by almost three thousand years when Kargaly was almost completely forgotten. In the middle of the 18th century, Russian merchants and industrialists bought vast areas of land, including the Kargaly, from the local Bashkir people at ridiculous prices (Chernykh, 1997: 92 – 98). The nominal landowners, the Bashkirs, did not even suspect then how rich the ground was – for hundreds of years they pastured their cattle there. The fact that Kargaly was forgotten for three thousand years is a mystery in itself as well as a paradox in the historical development of cultures in this vast region.

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* The surveying was carried out by a group of speleologists headed by I.O. Grek (Odessa).

History of study of the Kargaly complex

The actual discovery of the Kargaly complex as a unique historical and archaeological monument took place only in 1989 – 1990. The fact that archaeologists appeared here so late cannot but be puzzling, the more so if a number of curious circumstances is considered Among all the mines situated in the territory of Russia, the Kargaly complex was one of the earliest to be mentioned in scientific literature. Soon after Kargaly went into operation in 1744 – 1745, a well-known Orenburg specialist in regional studies, P.I. Rychkov, expressed his excitement at the amount of ancient workings there; information about the Kargaly mines was published as early as 1762 (Rychkov, 1999: 279 – 283). But then something strange happened: over a period of more than two hundred years, archeologists did not find time to research this remarkable complex.

The indifference archaeologists demonstrated is even harder to explain if we remember that the hypothesis about the start of exploitation of the Kargaly ore field in the Early Bronze Age (Yamnaya Culture) was proposed already 35 years ago. The grounds for such a conclusion was laid by an impressive series of spectrally analyzed metal objects from burial sites of the Yamnaya Culture localized in the Southern Urals and the Volga River region (Chernykh, 1966: 68, 69). Copper quite pure from the point of view of its chemical content (group of "copperbearing sandstone") served as a clear indication to the fact that Kargaly was the most probable source of this metal.

From the 1740s to the first decades of the 19th century, the first professional geologists and miners, as well as paleontologists, started arriving at Kargaly, first on short field trips and later on longer expeditions (Murchison, Werneil, Keiserling, 1849; Antipov-2, 1860: 292 – 296, 306 – 315; Efremov, 1954: 11 – 73, 370 – 375). Finally, a decade-long complex investigations conducted by the Kargaly Archaeological Expedition (1990 – 1999)* opened a new stage in the study of the history of the Kargaly ore field exploitation.

Archaeological sites

About two dozen Bronze Age settlements and four burial sites, as well as a kurgan of presumably the Sarmatian period have been discovered in the territory of the Kargaly ore field. The imprecise number of settlements mentioned here can be explained by indistinct borders between them. In many cases these borders were completely destroyed or covered by spoil heaps many meters long. It is sometimes very difficult to determine where one settlement ends and the next one begins: traces of culture layers may stretch continuously for more than 2 km (Fig. 7). Materials of the Timber Grave (Srubnaya) Culture dominate all the studied settlements. At the burial sites among the dominating Srubnaya Culture, graves and burials of the Yamnaya (Yamnaya-Poltavka) Culture may be found as well as the burials of the Sarmatian period.

The settlement Gorny, situated at area V of accumulation of workings, became the primary object for archaeological excavations in Kargaly (see Fig. 2, 8). The settlement is situated on a hilltop and tightly surrounded by surface traces of workings. This settlement of miners and metallurgists of the Srubnaya cultural and historic community was discovered in the field season of 1991, and starting already with the next summer it became the most important research site for the Kargaly expedition. All in all, excavations were carried out in Gorny during eight field seasons (1992 – 1999).

Materials

A comparatively small area (slightly exceeding 1,000 sq. m) was excavated during the eight field seasons. In parallel with the excavations and even ahead of them, an active geophysical electrometric surveying has been carried out over the last five years, the results of which turned out to be extremely effective. The anomalies revealed in the course of geophysical prospecting made it possible to draw an assessment-perspective map of locations of unearthed objects among those that had not been researched but were intended for future study (Fig. 9).

The comparatively slow speed of excavations was determined not only by the thickness of culture layers (to 2 – 2.5 m), but also by an extremely high concentration of findings in the layer under study. The number of extracted copper samples reached 3,100 specimens; also, 4,500 pieces of slag, 110,000 ceramic fragments, about 170 fragmented and complete casting molds, and more than 1,300 specimens of fragments and completely preserved stone hammers and beaters were discovered there. The most impressive finding, though, was an unbelievably huge "mountain" of bones of domestic animals (primarily cows); their number reached almost 2.3 million samples.

It is not inconceivable that the collections of copper samples and animal bones gathered here would exceed by their number and representativeness

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* Over this period of time, expedition participants published in Russia and abroad more than 60 works completely or partially devoted to the Kargaly complex.

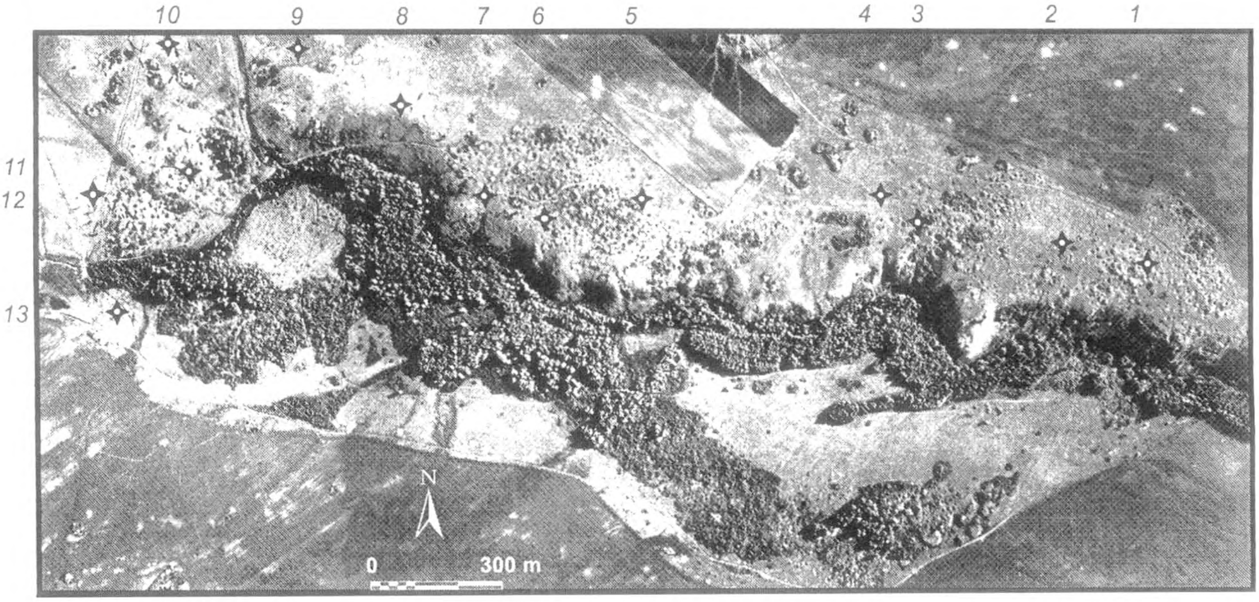

Fig. 7. Aerial photo of surface traces of workings in culture layers (marked with asterisks and numbered on the margins of the photo) on the plateau of Myasnikovsky ravine.

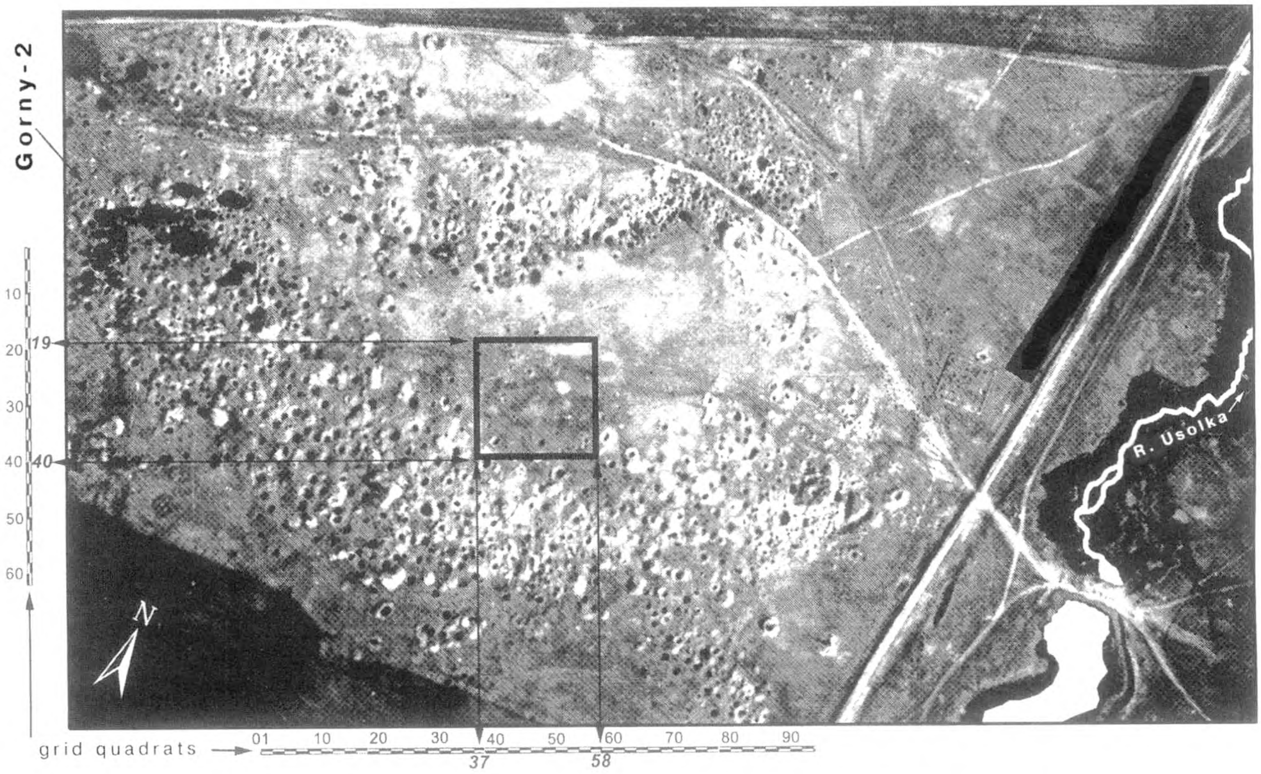

Fig. 8. Aerial photo of the Gorny hill with the settlement's area surrounded by thousands of traces from ancient and recent workings; a black square indicates the place of major excavations conducted at the site.

everything that was collected at a large number of the Bronze Age sites discovered in the Eurasian steppes. Willing to illustrate the point we are making, we shall restrict ourselves to giving just one example of the richness of the culture layer of Gorny compared to that of Arkaim (Table 2). The latter was chosen

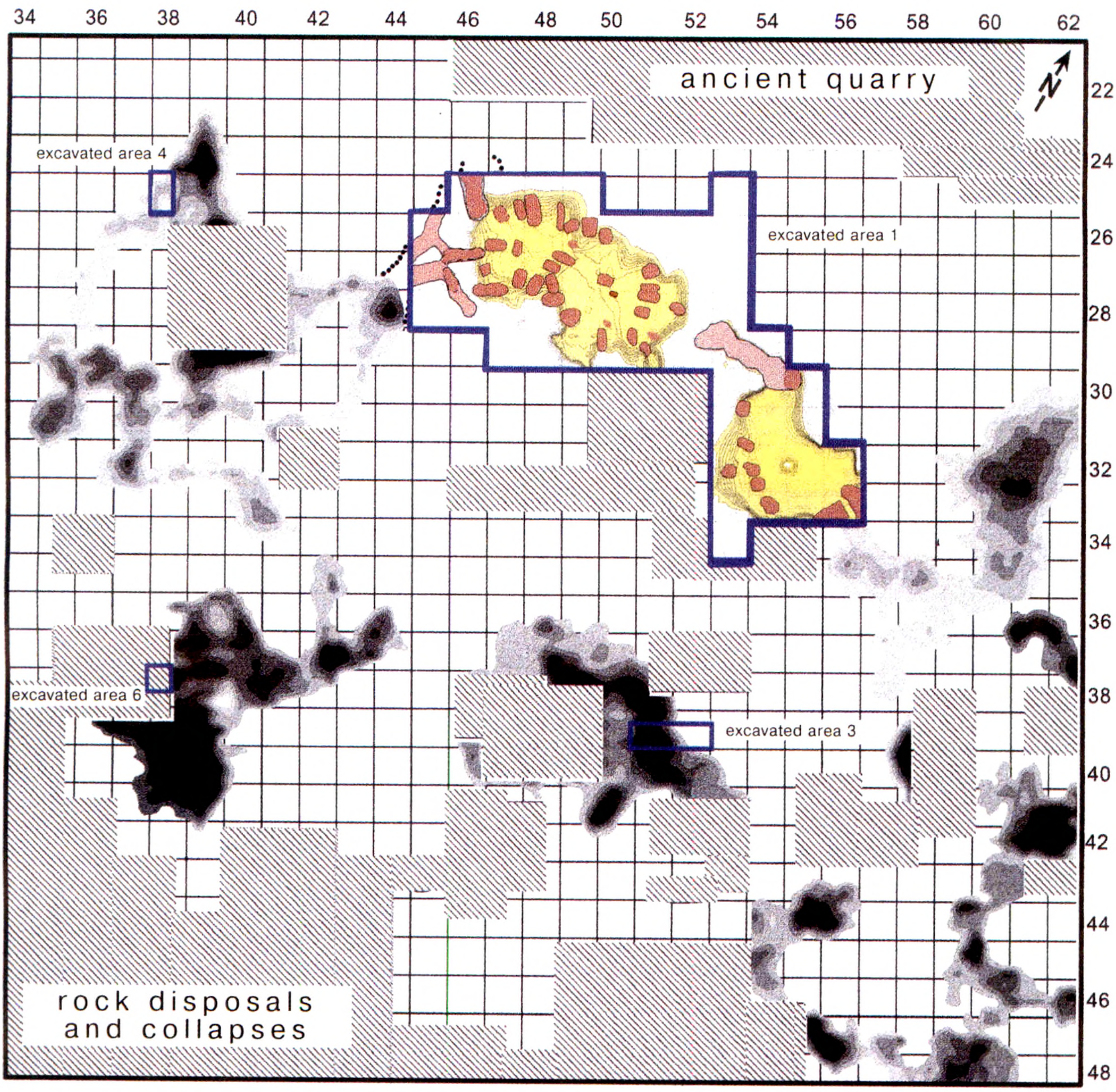

Fig. 9. Revealing of anomalies on the surface of Gorny by geophysical (electrometric) surveying, the excavated areas and a plan of the examined complexes (see Fig. 19).

because in the last 10 – 15 years there has been a tendency towards proclaiming it to be almost a "city" or at least a "proto-city" (Arkaim..., 1995; Zdanovich, 1997)*, essentially a prophecy of a mysterious civilization of the Great Eurasian steppe zone. The Gorny phenomenon at the background of a "city/proto-city" Arkaim is especially impressive: the dominance of the Kargaly settlement by the richness of its culture layer may exceed that of Arkaim by hundreds of times.

Out of all the diversity of collected materials, only ceramic dishware quite definitely conforms to a certain "ceramic standard" of the Srubnaya Culture. Here, the forms of so-called jars and pots dominate (Fig. 10, *5 – 12*); a noticeable number of vessels bear the features of the Andronovo ceramics of Fedorovo and Alakul types (Fig. 10, *1, 3*).

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* Speculative statements about the existence of a "land of cities" in the Eastern Urals region, about the Arkaim "city" or "proto-city" have appeared in many pseudoscientific articles and notes (see, e.g., just one enumeration in a special bibliographic reference book (Arkaim..., 1999)). A culmination of sorts in this strange process became the announcement about *Moscow being the third Arkaim* (Asov, 2001: 427 – 435). A review of the Arkaim "epic" see as well in a special article (Shnirelman, 2001).

Table 2. Comparison of concentration of finds in culture-bearing layers of Gorny and Arkaim

Feature	Arkaim	Gorny
Total area (ha)	1 7 – 1 75	3 – 4
Excavated area (sq m)	8055	880 (main excavation area N 1)
Ceramics fragments / reconstructed shapes of vessels (at least half reconstructed)	9000 / 304	~110,000 / 758
Copper samples / articles (including unidentifiable)	? / 15?	3053 / ~600
Casting moulds	?	169
Stone hammers	~ 40	1290
Slag (lumps)	?	4326
Bone fragments / artifacts or blanks	11834 / ?	2,230,869 / ~26,000

The metallic complex – shapes of articles and chemical composition of copper – is characterized by considerable diversity. The overwhelming share of findings (81%) is connected with metallurgy and metalworking producing: fragments of large and small ingots, drops, clean-ups, scraps, etc Only about 5% of the collection present morphologically determinable objects (153 samples) – tools and arms (Fig. 11). Adornments are represented extremely scarcely: only 15 objects of this sort were discovered. About 14% of findings (434 specimens) present the fragments of unidentifiable articles. Among the fragments of morphologically definite objects almost half are broken ends of heavy tunneling instruments of the hack type. Other articles consist of double blade knives, awls, needles, and fragments of large slashers ("sickles"). Apart from two bushing arrowheads made of tin copper (see Fig. 11), alien to the Kargaly complex, the metal of the objects presents chemically pure copper, typical "copperbearing sandstone" group of metal, so well-known and widely spread in East Europe.

Morphological originality of metal pieces is also manifested in the set of casting moulds, with the dominance of hack casting matrices (Fig. 12, 13). The moulds of two slashers is unique (Fig. 14). Lids with traces of exposure to high temperatures were often used as flat flaps. Cavities for casting rough and massive tools were cut from blocks of ordinary dense Kargaly sandstone. Casting moulds for more delicate articles such as knives were made of fine-grained local rock – shale and marl. The cavities of the latter were often covered with a thin layer of white refractory kaolin clay.

For the most part, a large collection of hammers (see Fig. 13) and sledge-hammers (Fig. 15) consists of tool fragments, although excellent complete samples of such tools have also been preserved. A clear distinction between two kinds of percussion tools can be made. Large rounded silicated river pebbles and small boulders represent the first kind of tools brought to Gorny from river valleys several dozens of kilometers away (for example, from the Salmysh). Fragments of fossilized trees of the Permian period used for ore crushing excavated from underground workings represent the second kind of tools (Fig. 16).

Bones of domestic animals comprise 99.8% of a huge collection of fauna remains (Fig. 17), with cattle making 80%, sheep and goats about 17%, horses 2%, pigs 0.3% of the collection; dog bones make a hundredth fraction of percent (although in one of the early settlements an intentional burial of this animal has been discovered). The number of bones representing either tools or their blanks is approximately 26,000, which constitutes slightly more than 1% of the collection. Among the tools, polishers, spatulas, and scrapers from cow jaws can be distinguished. One more kind of finding deserves mention: so-called blanks for wedges made by splitting a long cow bone lengthwise. Immediately, a sharp wedge was received which could be used for pricking out pieces of copper mineral rock. Our experiments have demonstrated that such a tool can be quite effectively used for working in mines over one- to two-hour periods of time. Wedge blanks comprise more than half of an enormous number of bone blanks. Finally, fortune-telling bones that make a rather peculiar kind of finding should be mentioned (Fig. 18).

Buildings in Gorny and periods of settlement functioning

The settlement culture-bearing layer contained a host of traces quite unusual for "standard" buildings of

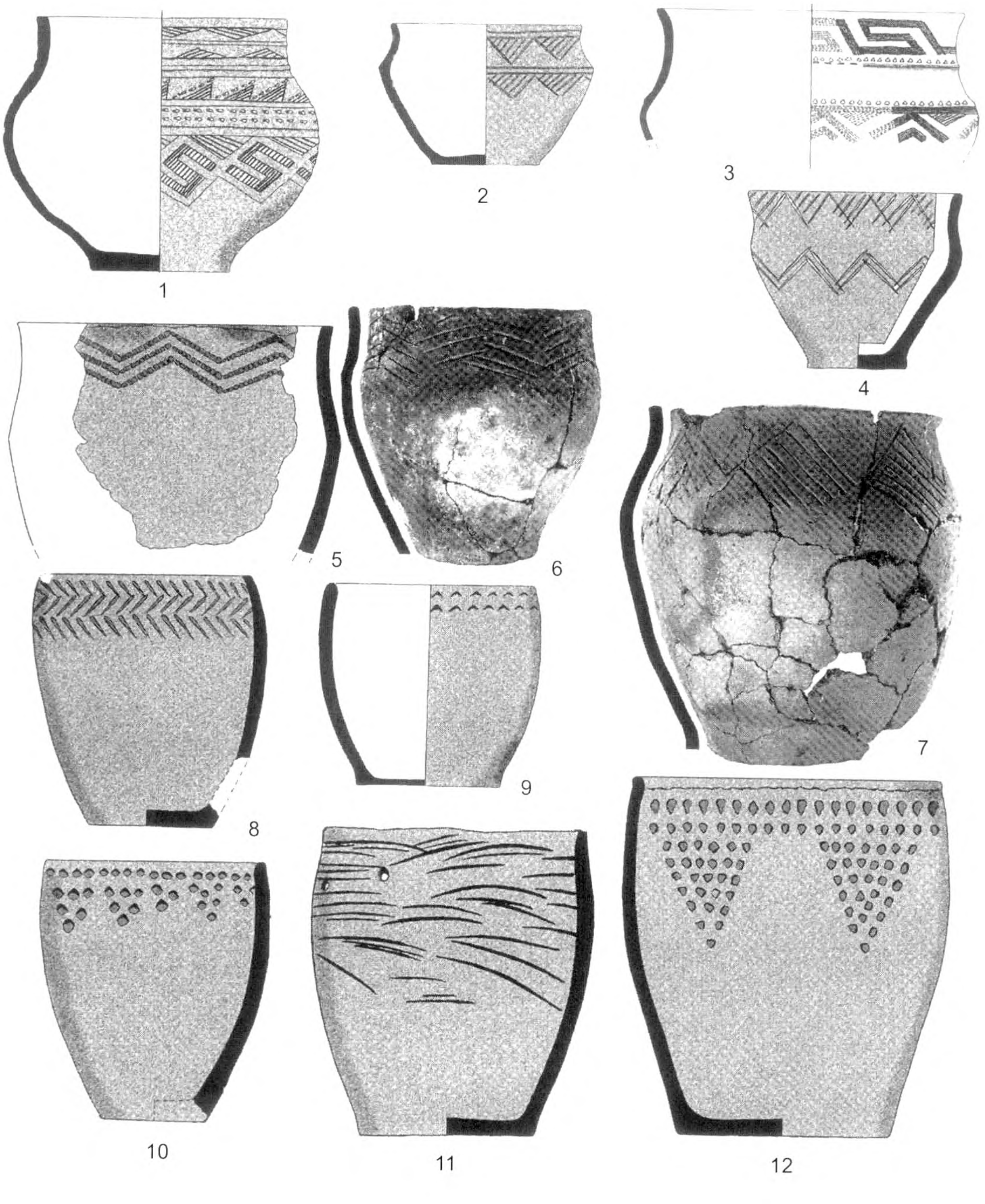

Fig. 10. Ceramic vessels from Gorny.

the Srubnaya Culture, such as small dwelling-burrows, huge dwelling and production complexes, sacral and sacrificial trenches. Each object had a clear stratigraphic position that brought the researchers particular satisfaction since it is quite often problematic to clearly determine the stratigraphy of culture layers at prehistoric sites in the steppe zone. As for Gorny, two basic phases in the settlement functioning may be easily distinguished.

The early phase (A) is represented by numerous deep (down to 190 – 220 cm) and narrow pit-dwellings or dwelling-burrows evidently of seasonal character (the number of excavated dwellings of this kind is about half a hundred) as well as a ramified system of ditches, a sacral construction that imitates a labyrinth of workings (Fig. 19, 20). Ditch sides have preserved the traces of temporary dwelling for people. The floor areas of the dwellings range from 2 to 3 sq. m; only a few of the dwellings are slightly larger. The dwellings

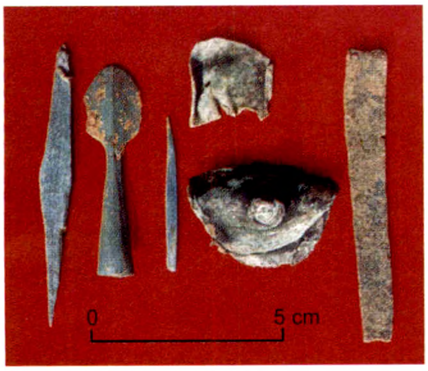

Fig. 11. Morphologically identifiable copper articles and a bronze arrowhead from Gorny.

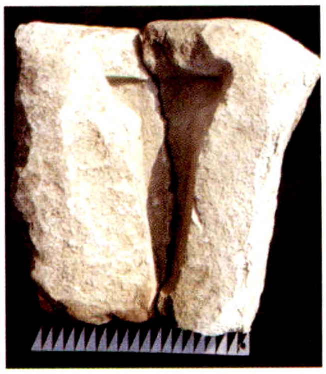

Fig. 12. Mould for casting a massive copper bede blank.

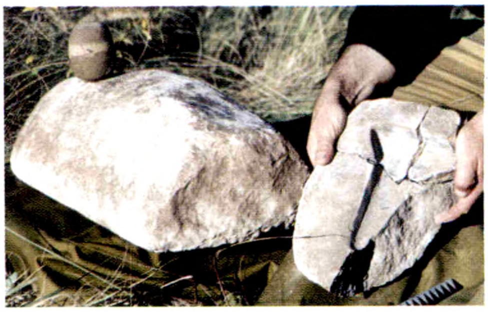

Fig. 13. A set consisting of a massive stone anvil (36 kg), a grooved pebble hammer, and a mould for casting a bede.

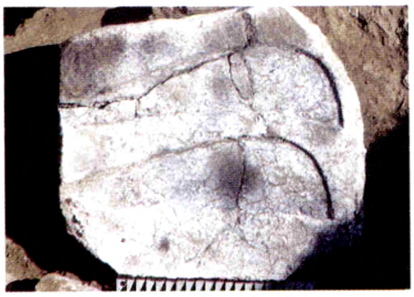

Fig. 14. Flap of a casting mould of large cutters.

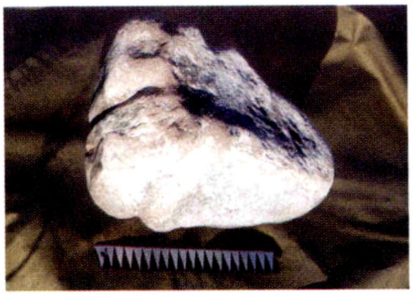

Fig. 15. Grooved hammer made from a small silicated river boulder.

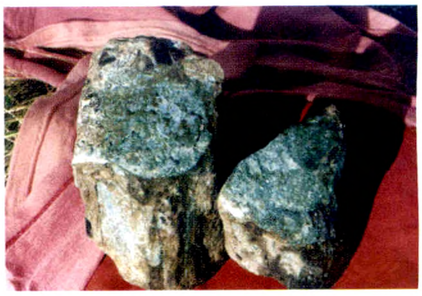

Fig. 16. Hammers for ore crushing made from a piece of fossilized tree.

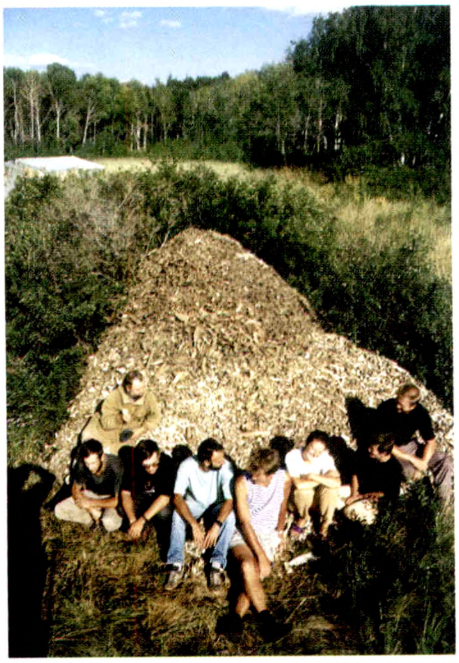

Fig. 17. A heap of archaeozoologically examined bones of domestic animals (over two million) from Gorny.

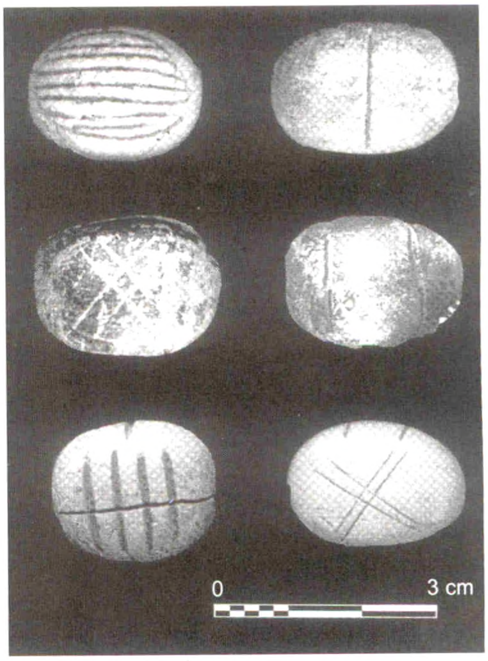

Fig. 18. Fortune-telling bones; each of four sides is usually marked with notches designating "one," "two," "four," and "many."

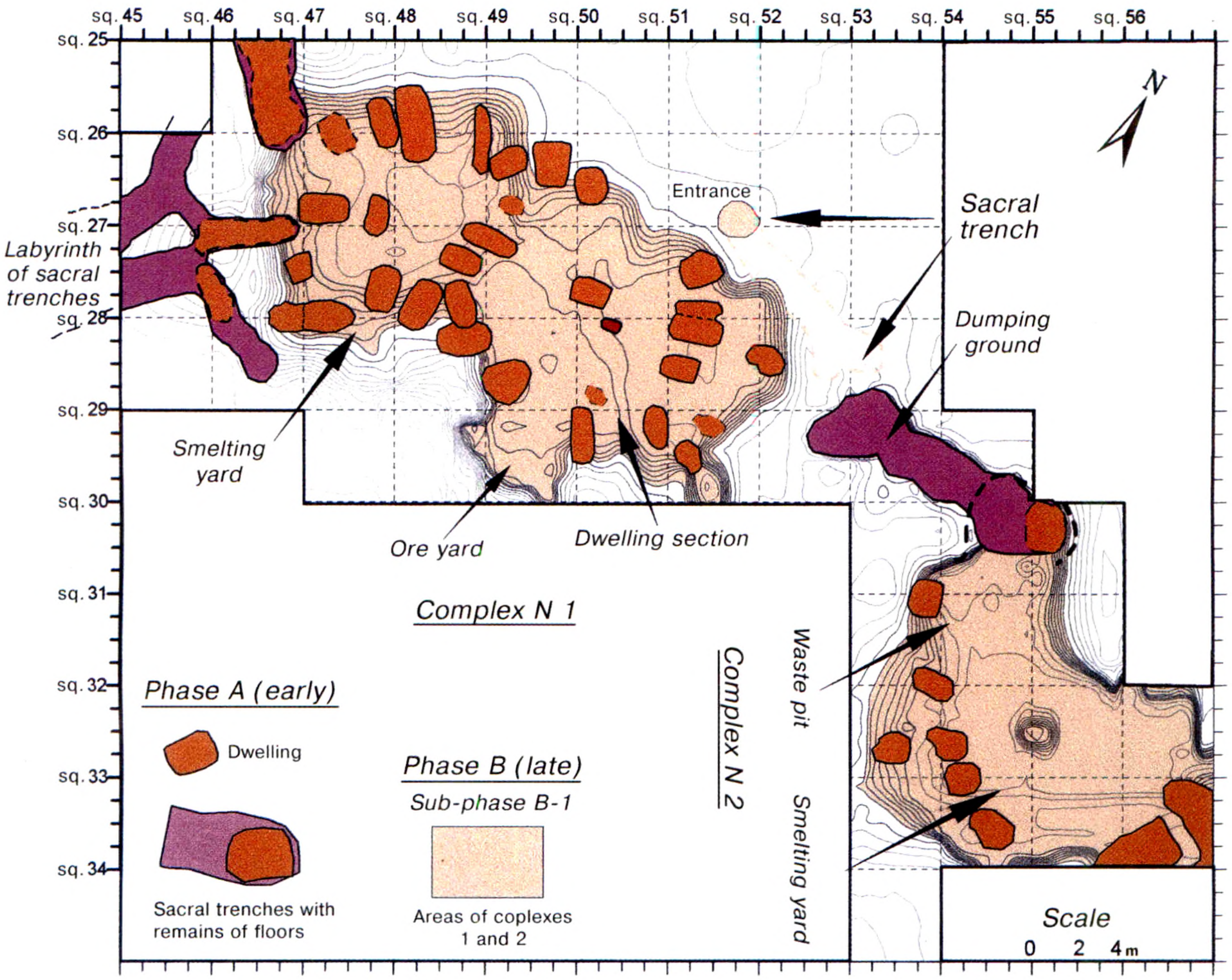

Fig. 19. Early dwelling-burrows at the background of later complexes N 1 and 2.

were intended for overnight stays and rest for three or four people. Archaeological remains are relatively scarce here (2.5 – 3% on average); they originate from bottom-dwelling parts of pits of earlier dwellings which were filled during the general re-planning of the settlement during the subsequent chronological stages. The regular culture layer of the early period outside the limits of bottom parts of dwelling pits is virtually nonexistent, or it is impossible to distinguish it correctly.

The late phase (B) was characterized by drastic changes in activity and subsistence strategies in Gorny. On the spot of destroyed and intentionally filled-in dwelling-burrows, trenches of enormous year-round complexes with dwelling space, smelting and ore yards were dug (see Fig. 19). For example, complex N 1 presents a single trench whose total area was up to 230 – 240 sq. m; it presented a quite complicated combination of dwelling and production premises and consisted of five main parts: (1) a dwelling (115 – 120 sq. m), (2) a smelting yard (approximately 200 sq. m), (3) an ore yard (up to 15 sq. m), (4) a sacral pit-gallery run under the embankment of the dwelling section, and (5) a pit-trench for waste located somewhat aside (then a sacral trench of an early phase used as a dump). Another complex (N 2) consisted of a sub-rectangular rounded trench where a smelting yard of 140 – 150 sq. m was situated, together with an adjoining waste pit.

In the course of general settlement re-planning as well as in the course of loam extraction, while large trenches were being dug, all the upper parts of early pit-dwellings were demolished, with only their bottom parts, chiefly the floors, having remained untouched; sacral trenches were also filled to the top and closely rammed. Essentially all the primary archaeological materials from Gorny (up to 97%) as well as the most impressive finds that belong to the Srubnaya Culture were dug in the regular culture layer of phase B.

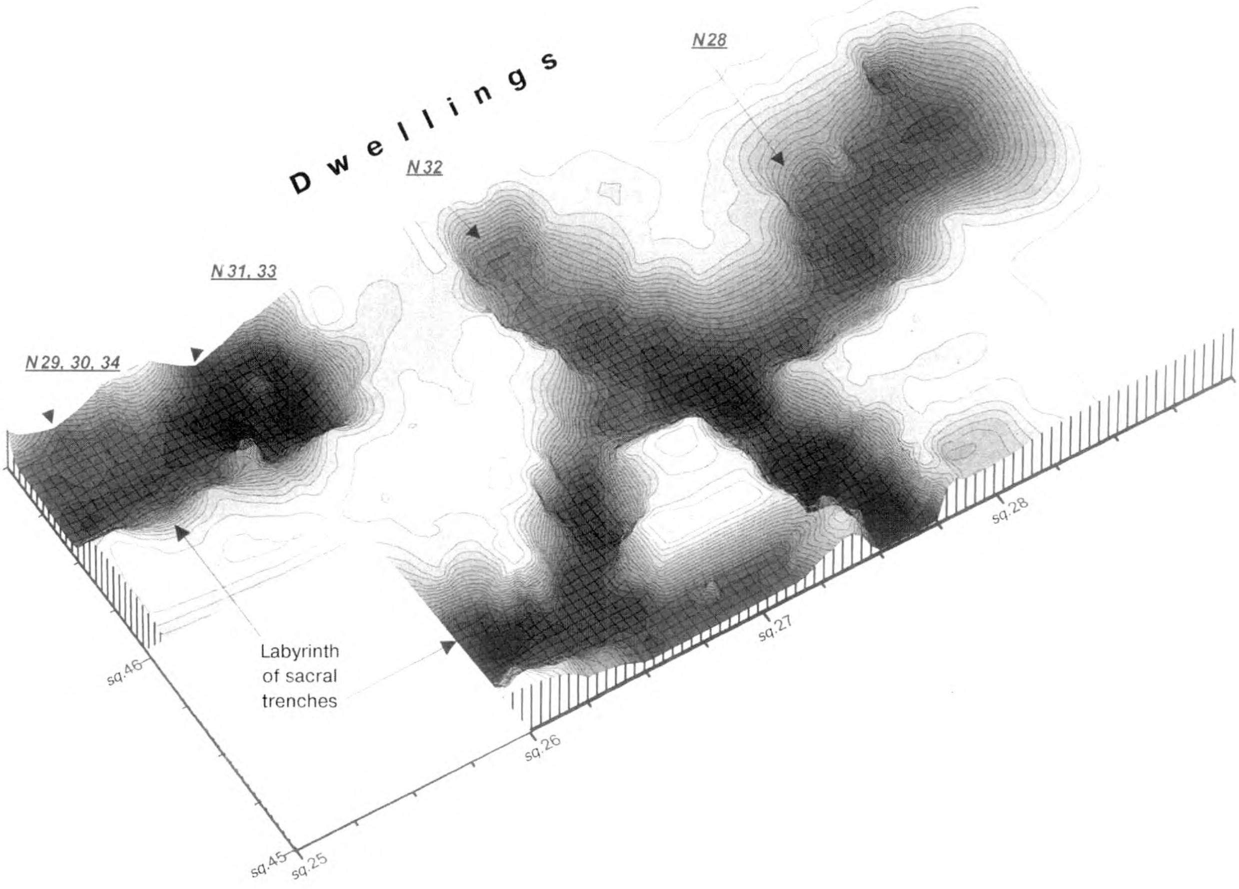

Fig. 20. The eastern margin of the labyrinth of sacral trenches in Gorny (the numbering of dwellings is shown at the trenches' ends).

On the other hand, during phase B life in Gorny did not develop steadily and continuously. Three sub-phases may be clearly distinguished in this phase: B-1, B-2, and B-3. At some stage of sub-phase B-1, large complexes were destroyed by fire that most probably resulted from an invasion of alien groups. Two bushing bronze arrowheads (see Fig. 11), one of which was discovered in a charred roof of the dwelling section, can suggest the eastern roots of the invaders.

Scarce traces left by the inhabitants of this period who had to huddle on the ruins of large complexes fall into the sub-phase B-2 characterized by a deficiency of materials. However, at some point people decided to abandon the hill they used to inhabit. Parting with the place where they lived for a long time was marked by the transfer of accumulated huge heaps of production waste as well as waste from people's everyday life to the still noticeable trenches of former complexes. As a result, the settlement site turned out to be intentionally leveled (sub-phase B-3). Three thousand years later Russian industrialists built small mud huts surrounded by stone; they were most probably intended for the rest of the mountain guard as well as other mining needs. However, already in the beginning of the Pugachov Rebellion these buildings had been burnt down; later they were not restored.

Thus, in the Late Bronze Age materials in Gorny were moved at least twice, not only horizontally but also vertically. The first movement resulted from the settlement re-planning in the course of transition to the dwelling on the hill, while the second took place already at the final stage of the settlement's existence when a huge mass of waste was thrown into trenches. This waste accumulated here during the sub-phases B-1 (the major portion) and B-2. Archaeological remains from the replaced waste heaps make up to two thirds of all the findings (!) from the Gorny layer. The described replacement resulted in distortion of a

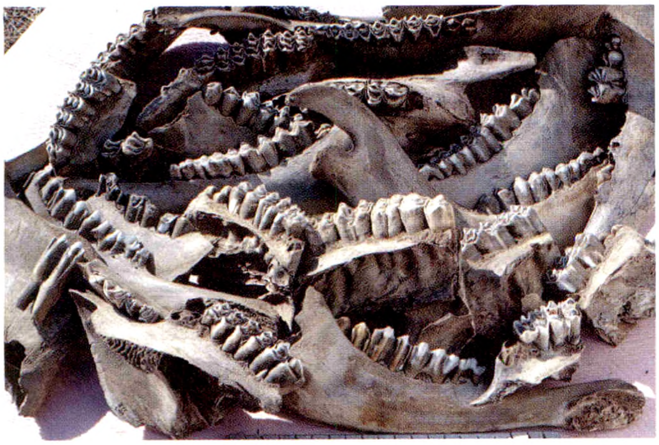

Fig. 21. Set of cow jaws from a sacrificial pit in complex N 1.

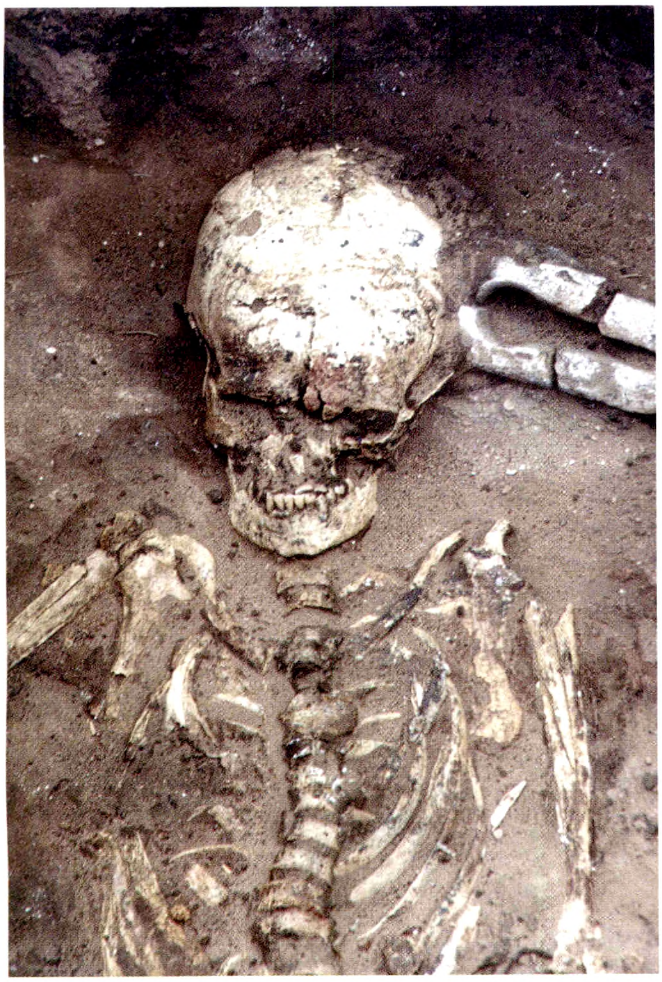

Fig. 22. Burial of the young copper founder with a casting mould located by his head (Pershin, kurgan 1, grave 4).

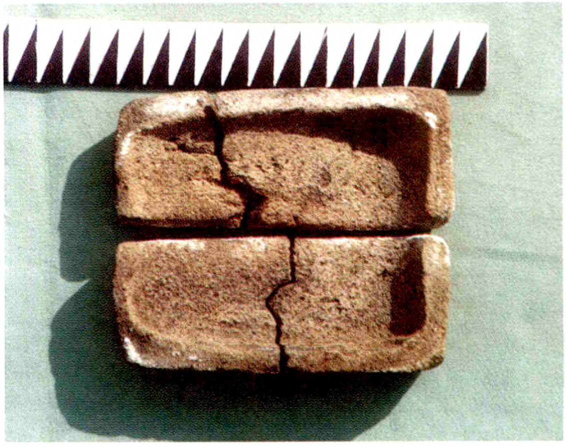

Fig. 23. Bivalve casting mould from the burial of the copper founder.

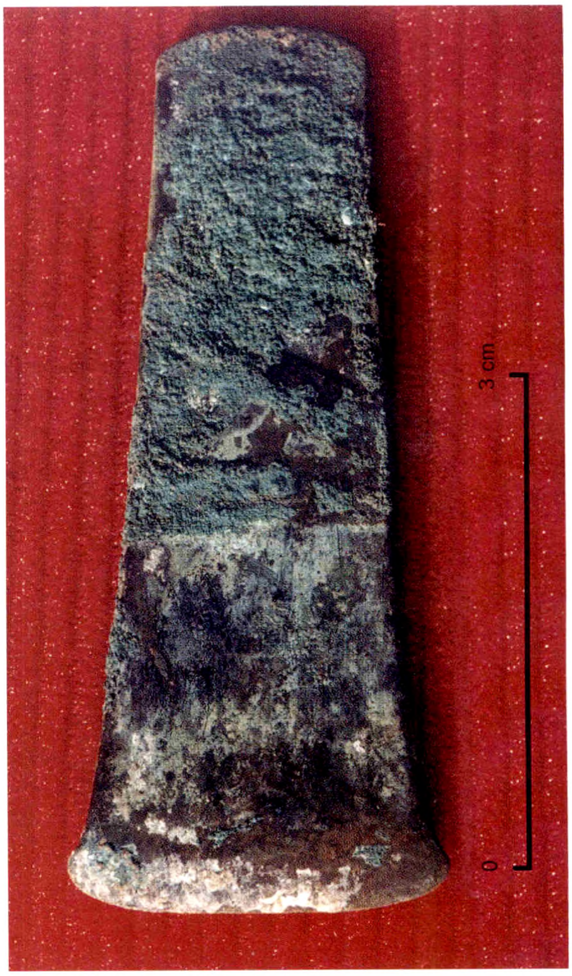

Fig. 24. Early – Middle Bronze Age copper flat axe from kurgan 1 in Pershin.

clear stratigraphic position of materials, which is especially evident against the background of clearly outlined stratigraphy of buildings.

In all likelihood, the transfer of waste heaps effected the chronological estimation of the time of the settlement's existence: a series of 16 calibrated radiocarbon dates made it possible to determine only the total time of existence of this specific settlement of the Srubnaya Culture predominantly within the range of the 17th – 15th centuries BC or 1690 – 1390 BC (at 68% probability threshold). We failed to spot the differences in the chronological ranges of the main phases.

Production organization

It can be assumed that the first phase in the existence of Gorny was connected with seasonal, predominantly summer, visits of the hill by the miners. For the most part, they extracted the ore that was most probably transported outside the Kargaly ore field. The scope of pyrometallurgical operations connected with copper smelting – if at all they took place on a dwelling hill – was relatively small. The same is true about the casting of copper articles here.

During the second phase practically all household manifestations and different operations of the metallurgical cycle were brought close together, i.e., everything was tied in a single knot: everyday life – ore extraction – ore dressing – copper smelting – tool casting and forging – sacral life – exchange operations. Miners and metallurgists who lived and worked in Gorny were highly professional; their workmanship was probably being perfected over many generations. Habitual and professional isolation of the Kargaly aborigines from other ("ordinary") groups of settled cattle breeders belonging to the Srubnay cultural and historic entity is quite evident, too; what's more, it affected all sides of the settlement's existence. Traces of their work testify to the fact that here not only ore was mined but also copper was smelted from it in large amounts, which was later used for casting tools.

The ecological situation played quite an important role. Steppe flora extremely poor in wood suitable for burning imposed strict limits on pyrometallurgical operations. This was the reason why in Kargaly copper was used for the manufacture of heavy tunneling equipment absolutely necessary for normal functioning of mining trade. Extracted ore became the article of active trade and exchange operations. We can judge about it indirectly by a disproportionately small amount of slag in the Gorny layer at the background of an enormous scale at which copper minerals were mined.

It is apparent that here copper was almost exclusively smelted for the local needs In Kargaly, there always existed a problem with fuel, thus the inhabitants of ore bearing hills preferred to export the minerals outside their region. The ore as well as probably some copper were transported only in a western direction. A considerable number of sites of the Srubnaya Culture (up to the Volga River) contain evidence of smelted ore that was most likely transported from the Kargaly ore field. On the other hand, for some unclear reason trade did not develop in eastern direction. The most natural and most likely explanation to this fact is as follows: what we see are innumerous traces of cattle driven from Kargaly in exchange for ore and only in part for metal.

Magic and rituals

Many sides of life and work of the Kargaly inhabitants are hard to explain rationally. For example, the extreme discomfort of living and working conditions in Kargaly is quite surprising. Dwelling and production complexes are situated on a top of a hill subjected to severe and frigid winter as well as sultry summer winds, while the water source is situated 0.5 km away from the settlement... Such a state of things can only be more or less satisfactorily explained through the beliefs held by the inhabitants of Gorny; they were subjected to the influence of mysterious conditions and demands of supreme powers.

The culture layer of Gorny is full of fauna remains (see Fig. 17). The number of domestic cattle (mostly cow) bones exceeds 2,250 thousand specimens! The animal herd exterminated here was so inconceivably huge that leading Russian archaeozoologist E.E. Antipina discards the possibility that so many head of cattle were kept on a regular basis by the Kargaly aborigines, whose primary occupation was mining and metallurgy. It is unlikely that the meat was exclusively used for food. Ethnological data testify that sometimes an improbably large number of animals were sacrificed during magic rituals that accompanied mining operations. There is practically no doubt that quite a considerable number of animals were slaughtered because of the beliefs held by the masters of Kargaly.

A large number of sacrificial pits filled to the brim with bones of mostly cow jaws (Fig. 21) and ribs have been preserved under the floors of the local complexes. It was the bones (and not parts of carcasses) that were put into the pits when smelting yards were sanctified. Such pits were at the base of excavated trenches, thus they became inaccessible after their flooring in the process of the settlement's re-planning (phase B).

The examined materials suggest that practically all spheres of both everyday life and work of the Kargaly inhabitants were permeated with magic. Traces of magic rituals left in Gorny are constant and varied. The culture layer contained, for example, a large number of fortune telling bones (see Fig. 18).

In all probability, they presented an indispensable accessory of the miner's life in his hard and risky underground search for the ore. Even more impressive is a complicated labyrinth of deep and narrow underground ditches, a rather specific imitation of tangled underground workings (see Fig. 20), which occupied a considerable area to the southwest of large dwelling-production complexes (see Fig. 19). It is here, in these twisting trenches, that the miners performed their rituals, conjuring the invisible "owners" of deep and insidious Kargaly entrails to be merciful to them.

The traces of magic rituals performed in Gorny are not limited to the ones mentioned here. All over the world in archaic societies metal was revered as a completely specific material worthy of religious worship as a gift from some supernatural power, which always asked for a strict observance of unusual rituals. The beliefs of the Kargaly miners and metallurgists were, without doubt, in harmony with such a world outlook*.

Early Bronze Age: Time of discovery of the Kargaly mines

Judging from the collected materials, the discovery of the Kargaly mines and the beginning of active work there was connected with the Yamnaya cultural and historical entity of cattle-breeders. Its metallurgy to a large extent determined the appearance and culture of the northern zone of a vast area occupied by this entity that formed a part of the Circum-Pontic metallurgical province (Chernykh, 1992: 54 – 171). The time when groups of early nomads from the Southern Urals inhabited Kargaly is associated with the existence of the prospecting (testing) quarry on the spot of the ancient settlement Kargaly**. Here the most ancient miner-prospectors carried a long (approximately 45 or 50 m) and deep (up to 9 m) pit in order to reveal exposure of rich copper ore in the hill' s bedrock sandstone. Exhausting work bore no fruit, since copper ore occurrence in the excavated area turned out to be quite poor. As a result of excavations in this testing pit, a series of ^{14}C dates was obtained through analysis of filling of burrows of ancient rodents that became a kind of reference point when determining the time of the pit's construction: it could only be *terminus ante quem* to the period when burrows appeared in the pit's heaps. A total of six dates was obtained. The main group of dates points to 2700 – 2100 BC with 68% probability threshold. However, a sample taken from the maximum depth provided a considerably earlier date, 4000 – 3600 BC. Hence, in any case the radiocarbon dates suggest that miners could not have started their prospecting activities on the Gorny hill later than the 4th – 3rd millennium BC.

The results of study of the tomb of a young master turned out to be to a certain extent even more significant. In the very center of Kargaly mining field, in the Pershin kurgan necropolis (see Fig. 2) a burial of a 12 or 13-year-old boy-moulder was excavated (Fig. 22). A casting mould of an axe of an early type was found there (Fig. 23). A calibrated radiocarbon date of 2900 – 2700 years BC was obtained for the burial. A flat adze of similar age was discovered in this kurgan (Fig. 24).

Finally, the exclusive spread of the "Kargaly" copper over the vast territory of the Volga-Ural region connected with a variety of articles referred to the Early and Late Bronze Age should be mentioned. In addition, objects made of "Kargaly" copper have been encountered among the things excavated from rich ("prince") kurgan burials of the same time in neighboring regions (Utevka and Tamar-Utkul VII burial grounds) (Vasiliev, 1980: 38 – 42, 57; Morgunova, Kravtsov, 1994: 14 – 17).

The discovery and initiated investigations of the Kargaly complex have quite considerably changed the views on the character, scale and organization of metallurgical production in the Great Steppe Zone of Eurasia. They have shed a new light on all the key elements of this trade, while the ties connecting them turned out to be much more complicated than it was previously presumed. New intricate questions and issues have emerged, the answers to which can only be received in the course of future studies.

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* A complex of magic rituals, surprisingly varied and hardly lending itself to interpretation, was observed in the majority of clans of miners in tropical Africa (see (Cline, 1937: 114 – 140)). On the other hand, it is highly improbable that the magic of the old Eurasian masters was less rich, although the amount of impressive evidence of it is less.

** Naturally, a Late Bronze Age settlement did not exist on this hill then.

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EASTERN CENTRAL ASIA AT THE DAWN OF THE BRONZE AGE: ISSUES IN ETHNO-CULTURAL HISTORY OF MONGOLIA AND THE SOUTHERN TRANS-BAIKAL REGION IN THE LATE THIRD – EARLY SECOND MILLENNIUM BC*

Introduction

The Eneolithic and Early Bronze Age of eastern Central Asia remain largely unexplored. The first materials dating from those periods were collected by Sosnovsky (1933) in the 1920s during his excavations of the Nizhne-Berezovskaya site, southern Trans-Baikal Region, where the Central Asian steppe zone is gradually replaced by East Siberian taiga. At about the same time, Andrews, Nelson, Bergman, and Maringer collected Late Neolithic and Early Bronze Age finds in the opposite part of eastern Central Asia: Gobi. In 1949 and 1960, Gobian sites were surveyed by Okladnikov (1962a: 88 – 89), who dated them to the Late Neolithic. More recently, Mongolian Late Neolithic and Early Bronze Age sites were excavated by Okladnikov, Derevianko, Volkov, and Novgorodova; those in the southern Trans-Baikal area by I. Kirillov, Grishin, Ivashina, Semina, and O. Kirillov.

Volkov and Novgorodova, based on their analysis of the available finds, concluded that archaeologically, Mongolia fell into three zones: western, eastern, and southern. In their view, the western zone is characterized by Afanasyevo-type burial grounds such as Altan-sandal and Shatar-chuluu, and by petroglyphs and surface finds similar to those from South Siberia; the eastern zone is represented by just one burial in Norovliyn-uul, and the southern zone has yielded finds from destroyed Gobian sites (Volkov, 1967: 11 – 12; 1981: 7, Novgorodova, 1989: 86 – 87). In the late 1980s, Novgorodova (1989: 119), after having reviewed all known sites of that period, noted that her conclusions were tentative, and further excavations were needed to specify the boundaries between Mongolian cultural zones

Materials collected by I. Kirillov (1979, 1981); Okladnikov and Kirillov (1980), Grishin (1975, 1981), Ivashina (1979, 1983), Semina (1986a, b), and O. Kirillov (1994a, b) in the Trans-Baikal area are more numerous than are those from Mongolia. The most important differences between the two areas are that, firstly, Trans-Baikal sites have yielded well-preserved and stratigraphically defined cultural sequences; secondly, numerous burials have been excavated there; and thirdly, the sites are situated both in steppe and mountain-taiga zones. Writers mentioned above have separated Eneolithic and Early Bronze Age sites from others and specified their chronological position within regional Neolithic and Early Bronze Age sequences established by them. Grishin (1981: 191 – 193) attributed them to the Budulan stage of the Late Neolithic – Early Bronze Age of the Trans-Baikal region (2500 – 1500 BC), I. Kirillov (1979: 47 – 50, 1981: 31 – 33) claimed that they represented the

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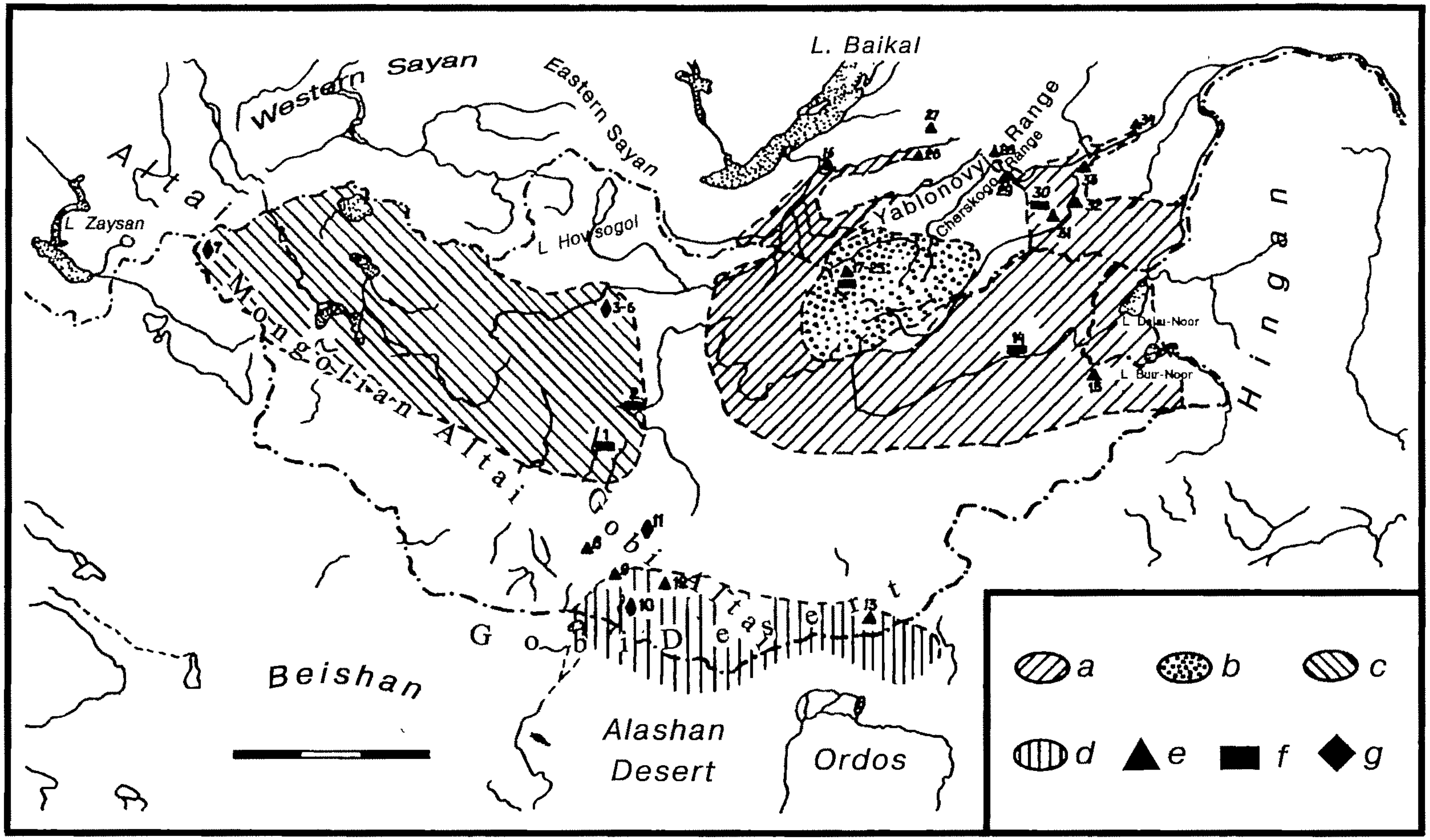

Fig 1 Cultural provinces and sites of eastern Central Asia in the Eneolithic and the Early Bronze Age.
1 – Shatar-chuluu, *2* – Altan-sandal, *3* – Chuluut I, *4* – Chuluut II, *5* – Chuluut III, *6* – Chuluut VII, *7* – Tsagan-Salaa – Baga-Oigur, *8* – Zuukh I, *9* – Tugrigiyn-shiret, *10* – Arabzhakh, *11* – Tevsh-ula, *12* – Shabarak-usu, *13* – Solonker-somon, Sulang-khad, *14* – Norovliyn-uul, *15* – Khuityn-bulak, *16* – Nizhnyaya Berezovka, *17* – Ust'-Menza I, *18* – Ust'-Menza II, *19* – Ust'-Menza III, *20* – Ust'-Menza V, *21* – Studenoe, *22* – Nizhnyaya Yelovka, *23* – Altan, *24* – Yegorkina Cave, *25* – Kristinkina Cave, *26* – Kulkison, *27* – Kharga I, *28* – Dvortsy, *29* – Zhigurzhinka, *30* – Lake Nozhiy, *31* – Kunkur, *32* – Kirochi, *33* – Ishikhan, *34* – Molodovsk
a – Selenga-Daurian Culture, *b* – Hentei Culture, *c* – Mongolian (eastern Central Asian) variant of Afanasyevskaya Culture, *d* – southern cultural province in Gobi, *e* – settlements, *f* – burial grounds, *g* – petroglyphs

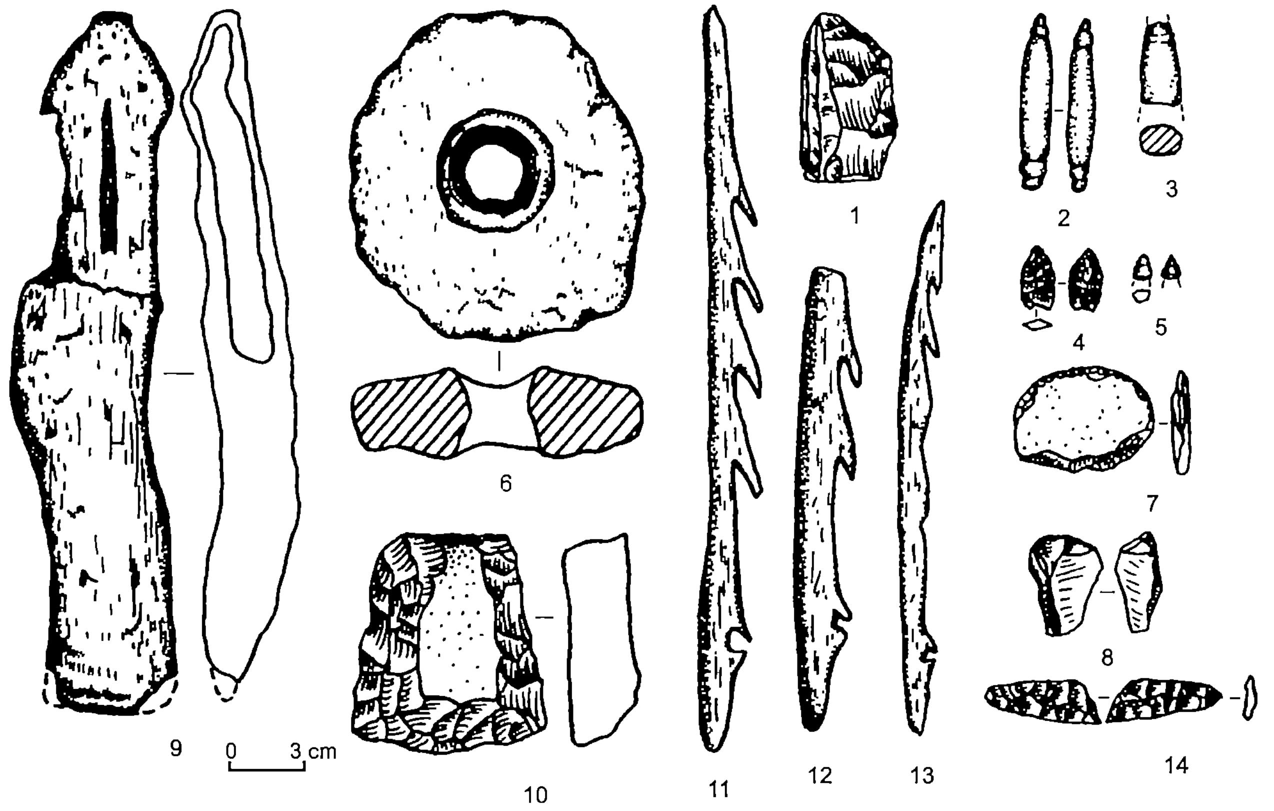

Fig. 2 Artifacts from settlements. Eastern steppe cultural province.
1 – core, *2, 3, 5* – rods from fishing hooks, *4* – arrowhead, *6* – discoid counterweight for a hoe (stone); *7* – side-scraper, *8* – end-scraper, *9* – hoe (bone), *10* – Gromatukhin-type adze, *11 – 13* – harpoons, *14* – knife *1, 11 – 13* – Nizhnyaya Berezovka (after (Sosnovsky, 1933)), *2, 6, 9* – Dvortsy (after (I Kirillov, 1979)), *10* – Zhigurzhinka I (after (Kirillov et al , 2001)), *3 – 5, 7, 8, 14* – Kharga I (after (Ivashina, 1983)).

Early Bronze Age of eastern Trans-Baikal region, roughly contemporaneous with the Glazkovo stage in the Cis-Baikal area (1800 – 1200 BC), and Ivashina (1979: 120 – 122, 124 – 125) synchronized them with the Fofanovo stage of the Buryatian Eneolithic and Early Bronze Age (most of the 2nd millennium BC). Semina (1986: 7, 10 – 11) dated the Early Bronze Age sites in the Hentei-Chikoi highland taiga to 1800 – 700 BC. In the eastern Trans-Baikal area, O. Kirillov (1994: 8 – 9) separated Eneolithic sites (late 3rd – early 2nd millennium BC) from those of the Early Bronze Age (1800 – 1500 BC).

The Early Bronze Age of northern Central Asia (including Mongolia and southern Trans-Baikal area), then, is well represented by archaeological finds. Their analysis makes it possible to specify certain details of the cultural history of prehistoric eastern Central Asia. The present article is based on finds from 33 sites including burial grounds, settlements, petroglyphs, certain sites in Gobi (Fig. 1), as well as on surface finds. The database is supplemented by an integral description of a sample from ca 100 burials in the eastern Trans-Baikal area (O.I. Kirillov 1994)*.

Finally, it must be noted that the Eneolithic of Mongolia and southern Trans-Baikal area, while being a separate period of the Bronze Age distinguished by a number of characteristic features (see (Eneolit SSSR, 1982: 7)), has received very little attention so far. From the introduction of metalworking onward, copper and bronze items may have co-occurred, making it quite difficult to draw a sharp boundary between the Eneolithic and the Early Bronze Age. For that reason, it appears justified at present to refer to the early stage of copper and bronze use in various domains of life of eastern Central Asians as the Early Metal Age.

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* See also: Kirillov O.I. Pogrebalnye pamiatniki epokhi paleometallov verkhoviev Amura Cand. Sc. (History) Dissertation. Novosibirsk, 1994 (unpublished).

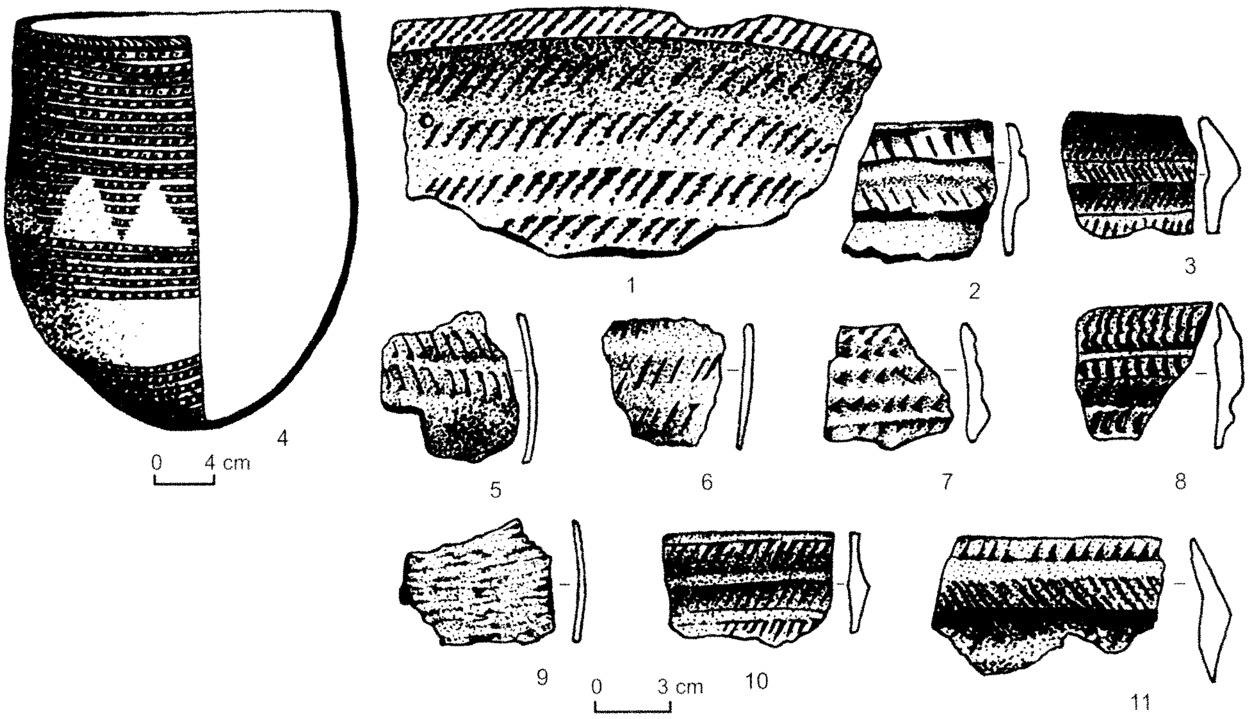

Fig. 3. Ceramics. Eastern steppe cultural province.
1 – Nizhnyaya Berezovka (after (Sosnovsky, 1933)); *2, 5 – 7, 9, 11* – Kharga I (after (Ivashina, 1983)); *3, 8, 10* – Dvortsy (after (I. Kirillov, 1979)); *4* – Zhigurzhinka I (after (Kirillov et al., 2001)).

Cultural provinces in the Early Metal Age

Eneolithic and Early Bronze Age was the period when producing economy and new cultures formed in the steppe and mountain-steppe areas of Eurasia. While the inhabitants of these regions had completed the transition to stock-raising and agriculture and began manufacturing copper and bronze tools, inhabitants of the mountain taiga continued to practice hunting, fishing, and gathering, and their lifestyles remained basically Neolithic. These differences are quite apparent in cultures of mountain-steppe and mountain-taiga zones of Mongolia and southern Trans-Baikal region. During the Early Metal Age, four cultural provinces formed here (Fig. 1): (1) eastern steppe (eastern Mongolia and southern Trans-Baikal area); (2) eastern forest (same territories); (3) western (western Mongolia); and (4) southern (Mongolian and Chinese Gobi). Each province is peculiar in terms of sites, finds, general appearance of culture, and the directions of cultural ties.

The eastern steppe province occupied the steppe and forest-steppe regions of southern Trans-Baikal area and eastern Mongolia. Apart from dune sites, it is represented by several settlements with well-preserved habitation layers: Nizhnyaya Berezovka (lower layer), Kulkison, Kharga I, Dvortsy, Ishakhan (layer 2), Molodovsk (layer 1), Zhigurzhinka (layer 4), Kunkur-1, Antipikha (layer 1), Kirochi, and Lake Khuytyn-Bulak. Some contemporaneous burial grounds have been revealed as well, including Norovliyn-uul and Lake Nozhiy (Fig. 1).

Rather deep (up to 30 – 50 cm) cultural sequences at settlements attest to a sedentary lifestyle. The habitation material includes diverse lithic and bone artifacts, ceramics, and numerous animal bones. Stone and bone tools included arrowheads, projectile points, end-scrapers, inserts, borers, side-scrapers, edged blades, micropoints, burins, rods from composite fishing hooks, preforms for fish-shaped baits, large cutting tools, a hammerstone, flat tabular pieces, pestles, horn harpoons with denticles situated on one side, points, awls, needles, frames for side-bladed tools (Fig. 2) (Sosnovsky, 1933: 212, fig. 1; Derevianko, Okladnikov, 1969: 155 – 156; Derevianko, 1986: 245; Istoriya..., 1986: 78; Kirillov I.M., 1979: 35 – 37; 1988: 7, 12 – 13; Ivashina, 1979: 60, 64, 69, 71, fig. 42 – 44, 47 – 49, plate 1; 1983: 47 – 52, 54 – 55, 58).

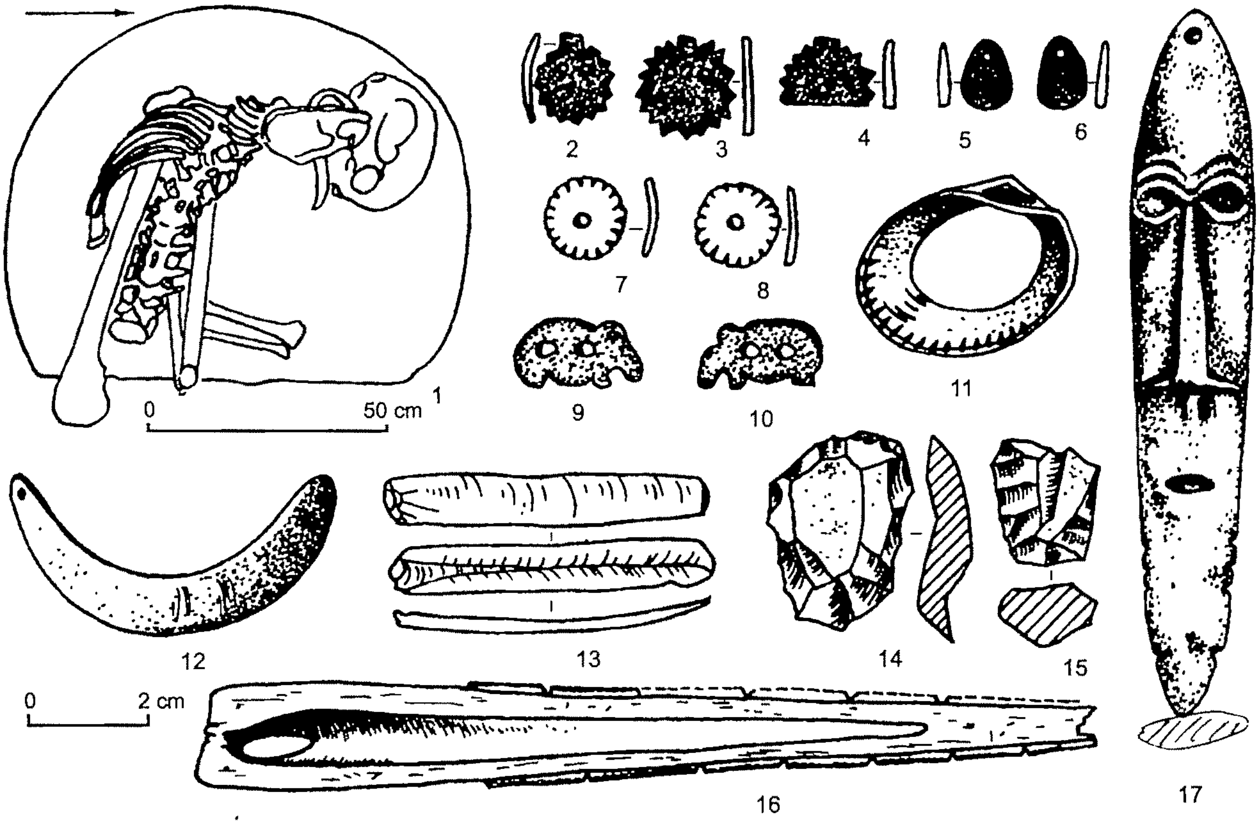

Fig. 4 Plan of Eneolithic burial and burial goods. Norovliyn-uul, Mongolia Eastern steppe cultural province.
1 – after (Volkov, 1975), *2 – 17* – after (Novgorodova, 1980, 1989)

Pottery was made by a percussion technique using a spatula wrapped in threads or bunches of grass. These vessels co-occur with thick-walled ones, having a more complex profile with everted rounded rims and flat bases. Many rims have thickened shoulders triangular in section. The design sometimes includes very simple geometric elements such as triangles and intersecting figures. The most common pattern, though, consisted of horizontal bands. The technique was pricked, stepped, and incised. Normally, the design covered the upper part of the body, but sometimes the entire surface and the inner part of the rims. A new design appears, composed of applied rolls with imprints of various stamps, and rows of pushed-out knobs (Fig. 3) (Sosnovsky, 1933: 210 – 212, plate I, *2*; Okladnikov, 1952: 312; Kirillov I.I., 1979: 35 – 38; 1981: 33, 1988: 7 – 8, 13 – 14; Ivashina, 1979: 59 – 61, 64 – 66, fig. 45, 50, 51; 1983: 46 – 57).

Bones were those of fishes (crucians, roaches, perches, and pikes), wild animals (goats, elks, Siberian deer, boars, saigas, hares, ducks, and geese), and domestic animals (horses, cattle, and sheep) (Sosnovsky, 1933: 212; Okladnikov, 1951: 323; 1952 312; Rygdylon, 1950: 28; Kirillov I.I., 1979: 6; 1988: 8; Ivashina, 1979: 64, 133; 1983: 54, 57 – 59). The predominance of bones of wild animals over those of domestic ones, as well as burials of dogs, and hunting and fishing tools suggest that the economy practiced by the inhabitants of steppes and forest-steppes of southern Trans-Baikal area and eastern Mongolia at that time was still largely based on foraging rather than on pastoralism or agriculture. Hoe-like tools, stone ring-shaped counter-weights from Dvortsy (see Fig. 2, *6*, *9*), Kirochi, Bain-Bulak, Ishakhan (Kirillov I.I., 1979: 36; 1981: 32; 1988: 7, fig. 1, *22*, *23*; Okladnikov, Kirillov, 1980: 164 – 166), from burials in the Argun River basin (Aseyev, 1997: 23)* and from the Nizhneberezovskoye site (Sosnovsky, 1933: 212)** are believed to be agricultural tools.

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* See also: Kirillov O I Pogrebalnye pamiatniki epokhi paleometallov verkhoviev Amura. Cand Sc. (History) Dissertation Novosibirsk, 1994, p. 47 (unpublished).

** See also Sosnovsky G P. Eneolit Selenginskoi Daurii. Archive of the Institute of History of Material Culture. G P. Sosnovsky's Archive. F-42, N 164, p 5).

This was the time when people living in the Trans-Baikal area and eastern Mongolia began to use metals: copper and bronze. The fact that metal was not merely used, but melted, is evidenced by certain artifacts as well as by copper and bronze slags and drops of metal. In Dvortsy, pieces of copper-bronze slag and two fragments of metal artifacts were found, in Molodovsk, a copper fishing hook, in Antipikha, a four-sided awl, in Ishakhan and Kirochi, fragments of copper and bronze artifacts plus fragments of clay ladles for molten metal in the latter site (Kirillov I.I., 1979: 36; 1981: 32; 1988. 7, 14), in Kulkison, a fragment of a bronze or copper ring (Ivashina, 1983: 51, 60), in Kharga I, two fragments of a bronze pipe-shaped bead (Ivashina, 1979: 64; 1983: 54, 60). In Khuytyn-Bulak, pieces of slag with drops of copper were found near some hearths (Dorj, 1971: 77).

The use of metal changed the attitude to stone. According to I. Kirillov, the prismatic blade core technique and the blade technique in general degraded at that time, and the number of retouched blades decreased, up to 45 – 50% of them being inserts with retouched edges. Accordingly, the number of flakes and knapped pebbles and the proportion of tools made on them increased. Large tools are represented by adzes, discoid side-scrapers, fishing weights, hammerstones, pestles, and hoes (Kirillov I.I , 1979: 36 – 37; 1981: 27, 33; 1988: 6 – 7, 12 – 13).

Early Metal Age burials in eastern Mongolia and the southern Trans-Baikal region fall into several types. The first one mostly continues Neolithic traditions. The most important burial of this type was excavated in Norovliyn-uul (Fig. 4) (see (Volkov, 1975; Novgorodova, 1989: 78 – 80) for a description). It combines features typical of both Neolithic burials of eastern Mongolia and southern Trans-Baikal area (seated position of the deceased, deep burial chamber, absence of external markers above the grave, and abundance of ochre), with those of the Eneolithic burials (richer and more diverse burial goods, and their typological similarity to certain Eneolithic artifacts). The same type includes the Argun group of Eneolithic burials in eastern Trans-Baikal area separated by O. Kirillov*.

The distinctive feature of the second type are stone pavements up to 4 – 6 m long. The graves are up to 1 m deep, and the position of the buried is flexed (on the side or supine) or, less often, extended supine. Ochre was used occasionally**. The orientation of the bodies changes along the west-to-east axis. New burial goods include hemispheric buttons and rod-like pendants made of shells, and almond-shaped pendants made of minerals (they became prototypes for similar ornaments made of bronze). Stone items continue to predominate, but become much less diverse. Bronze artifacts are few and include tanged knives, pipe-like beads, buttons, and 8-shaped copper sheets that were applied to clothing. The pottery is heavily fragmented. Flat-bottomed jar-shaped vessels appear, and small tripods occur among the finds*.

The third type is represented by burials near Lake Nozhiy. Its characteristic features are rectangular pavements, the long axes of which are oriented from east to west. They are 40 – 70 cm thick and 6 – 7 m long. Shallow grave pits (up to 45 cm in depth) were covered with slabs placed across them. The burials were supine extended, heads facing east. Ochre is present. Burial goods include beads various in shape and size, made of cornelian, agate, pyrophillite, and bone, and a large round pendant. In one of the pavements, a horse mandible was found together with small bones of animals. Pottery was lacking (Okladnikov, Kirillov, 1980).

In our view, the three types of Early Metal Age burials in the southern Trans-Baikal region and eastern Mongolia attest to an evolution from the Neolithic standards (the bodies being seated, half-seated or crouched), with few if any marks on the surface (Derevianko, Okladnikov, 1969: 152 – 153, fig. 3, 4; Okladnikov, Derevianko, 1970: 8, fig. 3; Dorj, 1971: 44 – 45; Kirillov, Verkhoturov, 1985), toward burials with low oval cairn-like pavements and, later, rectangular pavements up to 70 cm thick This likely reflects the evolution of the burial rite over the entire period, possibly related to the transition to a production economy. Evidently, in the Early Bronze Age, pastoralism was gradually becoming one of the most important sectors of economy practiced by the steppe dwellers of eastern Mongolia and the Trans-Baikal region.

Burials under oval multi-tiered pavements and, especially, under rectangular ones, excavated near Lake Nozhiy, attest to radical changes in the funerary rite in the steppe areas of Mongolia and the southern Trans-Baikal area during the Eneolithic and Early Bronze Age as compared to the Neolithic. Seated or crouched position and various orientation of the deceased, typical of the Neolithic (Derevianko, Okladnikov, 1969: 152 – 153, fig. 3, 4; Okladnikov, Derevianko, 1970: 8, fig. 3; Dorj, 1971: 44 – 45; Ivashina, 1979: 103 – 106; Okladnikov, Kirillov, 1980: 111 – 119; Kirillov, Verkhoturov, 1985), give way to extended supine burials with heads oriented to the east. A new feature appears: the use of domestic animals in the funerary rite. While Neolithic graves were either unmarked on the surface or marked by sparse pavements overgrown with turf, those of the Early Bronze Age were covered by slabs placed across the grave, and on the surface, rectangular pavements of considerable thickness were constructed, well visible from afar against the background of the steppe landscape. They appear to have marked the animal breeders' right to use of the land around the clan or family burial grounds as pastures.

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* Kirillov O.I Pogrebalnye pamiatniki epokhi paleometallov verkhoviev Amura Cand Sc. (History) Dissertation. Novosibirsk, 1994, pp. 44 – 48 (unpublished).

** Ibid · 34 – 35, 39 – 42, 44 – 45.

* Ibid.. 51

These changes were evidently associated with the transition to a production economy. They attest to new features marking the beginning of the Metal Age in the steppe zone of the southern Trans-Baikal area and eastern Mongolia. Regrettably, no Russian or Mongolian specialists have focused on cultural or chronological correspondences between the western and eastern Trans-Baikalian and eastern Mongolian sites with a view of merging them into a single culture or, on the contrary, subdividing them into various cultural associations. Nor was any special term proposed to refer to the culture of the above three areas, that were, basically, parts of a single cultural region.

I.I Kirillov (1981: 32; 1988: 13), who has studied the Early Bronze Age of the eastern Trans-Baikal region, noted that sites such as Dvortsy were situated within the distribution area of the Neolithic Onon Culture, implying that the latter continued to exist during the Early Metal Age. This idea was supported by O.I. Kirillov (1994: 9), who integrated the finds dating from that period. However, it is hardly justifiable to retain the name of the older culture with reference to sites of a radically new period. Ivashina (1979: 124 – 125, 157) described materials from the western Trans-Baikal area as the Fofanovo stage of the Eneolithic and Early Bronze Age, Dorj (1971) and Navaan (1975), who analyzed Neolithic and Bronze Age sites of eastern Mongolia, have not paid enough attention to Early Bronze Age associations.

In our view, the above summary of materials from sites in the steppe and forest-steppe of the Trans-Baikal area and western Mongolia demonstrates a considerable similarity between the two regions in terms of stone and bone artifacts and, notably, ceramics (this refers to technology, decoration techniques, and composition of design). Apparently these materials should be attributed to a single cultural province having local variants or possibly even to a single culture. Territorially, it encompassed vast regions of steppe and forest-steppe in the Middle Selenga basin, the Shilka – Argun interfluve, the Onon basin, and eastern Mongolia. Southern steppe parts of Trans-Baikal region have been traditionally referred to as Dauria. We propose to describe the eastern steppe cultural province in the Early Metal Age as Selenga-Daurian Culture or cultural province. It encompasses eastern Mongolia and southern Trans-Baikal area and will thus be acceptable for both Russian and Mongolian archaeologists making it possible to avoid the current dual designation of this culture or cultural province*.

The eastern steppe cultural province occupied the mountain-taiga areas of southern Trans-Baikal region and eastern Mongolia. The Early Metal Age culture of the taiga is represented by sites such as Ust'-Menza I (three horizons), II, and III (one horizon in each), Studenoye, Nizhnyaya Yelovka (one horizon in each), Altyn (five horizons), Yegorkina Cave, and certain burials in Ust'-Menza III and V (see Fig. 1). All metal artifacts are made of bronze (Konstantinov, Semina, 1980; Semina, 1983, 1985, 1986, 1986a; Bazarova et al., 1986; Rodnikova, Selin, 1986; Sukhoparova et al., 1990).

The forest people of the Early Bronze Age, judging by the results of excavations in the Chikoy-Menza province in northern Hentey Mountain system, while being familiar with metal, mostly preserved the Neolithic lifestyle including foraging economy (hunting, fishing, and gathering). Metal (bronze) first appeared in the early 2nd millennium BC. Evidence of metallurgy (a piece of oxydized copper ore, slags, drops of bronze, a pit for heating charcoal) and metalworking (fragments of moulds) attests to the existence of an incipient center of bronze metallurgy based on local raw materials (Semina, 1986: 12)**. Metal artifacts, however, replaced stone ones to a minor degree only, and stone continued to be the most widely used material at that time (Semina, 1986: 154); Konstantinov, Semina, 1980: 102, 104; Sukhoparova et al., 1990: 188 – 189)***. It may be suggested, then, that bronze metallurgy was not highly developed in the mountain-taiga areas of southern Trans-Baikal region and northern Mongolia during the Early Metal Age.

The stoneworking technique and the toolkit retained all the achievements of the Neolithic. However, with the transition to the new Paleometallic

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* Examples include the Neolithic Onon Culture in eastern Trans-Baikal area and its Mongolian counterpart, the Tamtsag-Bulak Culture of eastern Mongolia, the Scythian-period Uyuk Culture of Tuva and its counterpart in adjacent parts of Mongolia: the Chandman Culture. Long ago, Debets proposed the term "Daurian" with reference to the Neolithic culture of southern Trans-Baikal region, but his idea was not supported

** See also: Semina L.V. Epokha neolita i paleometalla Yugo-Zapadnogo Zabaikalia Cand. Sc (History) Dissertation. Leningrad, 1986, p 156 (unpublished).

*** See also (Ibid.· 154)

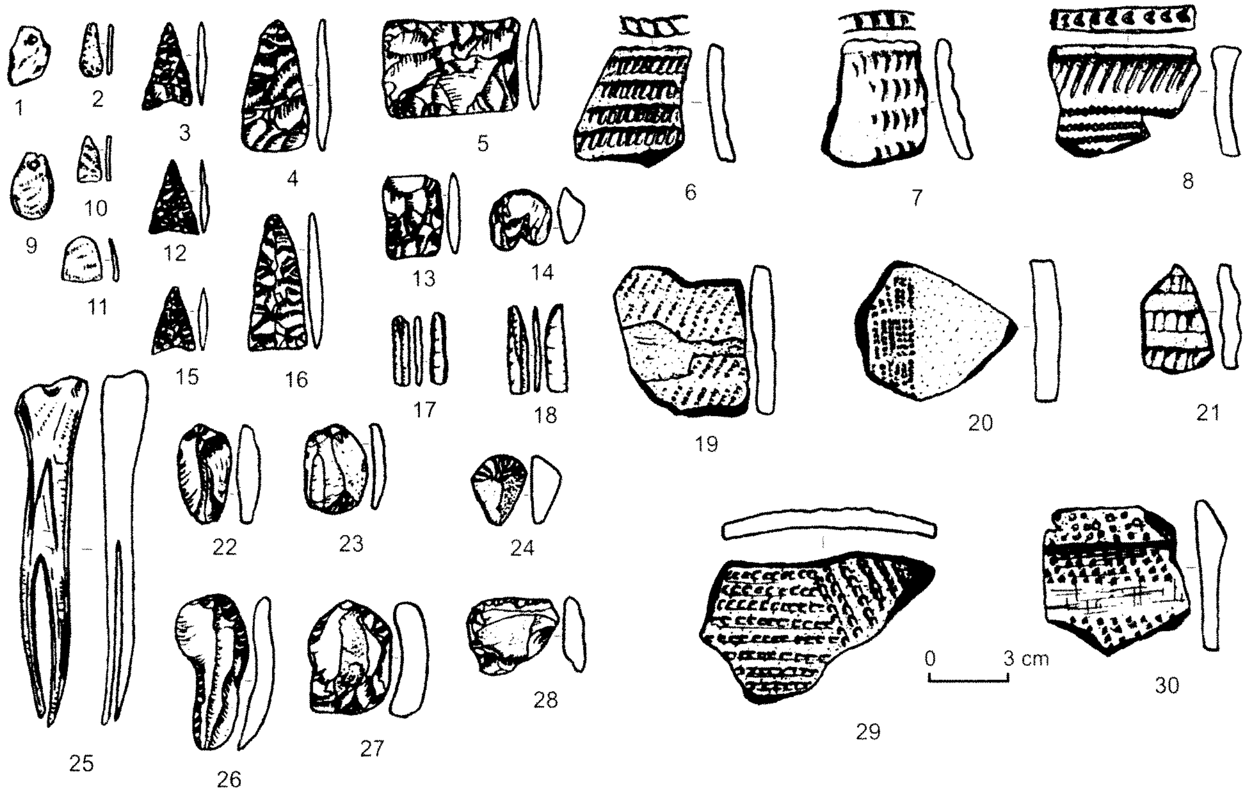

Fig. 5. Artifacts (after (Semina, 1983, 1985)). Eastern forest cultural province.
1, 9 – pendants; *2, 10* – bronze arrowheads; *3, 4, 12, 15, 16* – stone arrowheads; *5, 13* – inserts; *6 – 8, 19 – 21, 29, 30* – ceramics; *14, 22 – 24, 26 – 28* – end-scrapers; *17, 18* – single-edged blades; *25* – knitting tool.
1 – 5, 9 – 18, 22 – 28 – Kristinkina Cave, *6, 8, 21* – Ust'-Menza I; *7, 19, 20, 29* – Ust'-Menza II; *30* – Yegorkina Cave.

Age, the number of tools on blades decreases, although they continue to play a major role; accordingly the number of tools on flakes increases (Konstantinov, Semina, 1980: 98 – 102; Semina, 1984: 129 – 130; 1986: 10 – 11; Sukhoparova et al., 1990: 189).

Pottery was made by a percussion technique using a hammer wrapped in threads. The new custom was to smoothen and slightly polish the surface of the vessels. The rims become slightly everted, marking the neck. The rims are oval in section or shouldered. Flat-based vessels appear. The decoration becomes richer and more diverse, extending on the rim and the body, sometimes even on the base. The inside of the rim and its edge, too, are decorated. Ornamental bands form lines, alternating with undecorated spaces, or running at various angles to each other. The design was either pricked or stepped or incised (Fig. 5) (Semina, 1985: 113 – 119; 1986: 11).

Judging by burials in Ust'-Menza III and V, the funerary rite practiced by forest dwellers of the Hentei-Chikoi highland was characterized by typically Neolithic features. The burial goods, if present, were few and unexpressive, ochre was abundant, the bodies were crouched. However, new traits appear, such as stone pavements above the graves, relatively large burial pits, and west-to-east orientation of the burials (Fig. 6) (Rodnikova, Selin, 1986; Bazarova et al., 1986).

The Bronze Age culture of the Hentei-Chikoi highland, which was first separated by Semina (1986: 14) has been given no name so far. We propose to denote it as the Hentei Culture according to the name of the mountain system that is situated both in the Trans-Baikal region and in Mongolia. Like in the case with the Selenga-Daurian Culture, this would help avoid two synonymous terms (used by Russian and Mongolian archaeologists, respectively) with reference to the same archaeological culture.

Generally, in the Early Metal Age, the forest and steppe areas of the southern Trans-Baikal region and eastern Mongolia were inhabited by Mongoloid populations exhibiting numerous similarities in their material culture. The parallels include pottery manufacturing techniques, decoration, and certain types of stone and bone artifacts. These populations were not quite homogenous in terms of culture, though, as evidenced by differences in the burial rite.

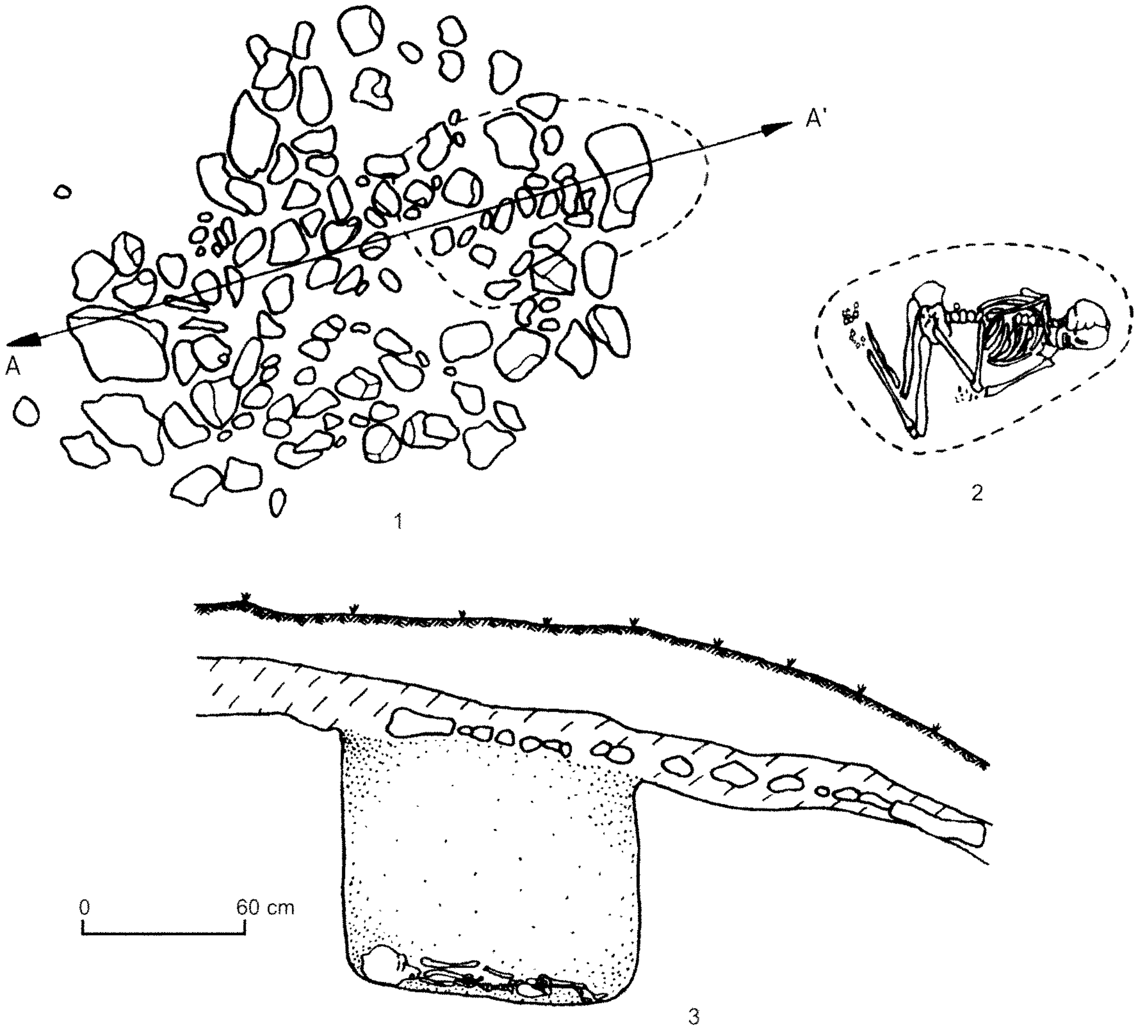

Fig. 6. Bronze Age burial (after (Rodnikova, Selin, 1986)). Ust'-Menza V. Eastern forest cultural province.
1 – pavement above the grave; *2* – skeleton; *3* – transect along the A – A' line.

The steppe burials, as mentioned above, differ from the Neolithic ones. In contrast, the few burials in the taiga zone retain numerous Neolithic characteristics, implying that the culture of the two population groups evolved along different routes. Doubtless, this was due to the emergence of pastoralism and agriculture in the steppes, on the one hand, and the conservation of foraging economy in the taiga, on the other. While the forest hunters and fishers continued to sophisticate their former adaptations, the steppe dwellers developed new ones by mastering livestock raising and possibly agriculture. The key role could have been played by environmental changes that occurred in late 3rd – early 2nd millennium BC. Specifically, the climate in the Trans-Baikal region and Mongolia was becoming more and more arid (Vipper et al., 1978: 21 – 22; 1981; 1989: 164 – 165; Dinesman et al., 1989: 198 – 199, fig. 1, 7), which, eventually, played the crucial role in the final transition of the steppe populations to livestock raising in the Middle and Late Bronze Age. Economical changes brought about new features in the material culture and burial rite. Gradually, differences in the material culture and ideology between the steppe and forest people of southern Trans-Baikal region and eastern Mongolia began to acquire an ethno-cultural meaning.

The above suggestion is consistent with petroglyphic evidence (Okladnikov, Zaporozhskaya, 1970: 129 – 132; Okladnikov, 1981a: 6, 69; Mazin, 1988, 1994). Typologically and chronologically, most information concerning the petroglyphs comes from the Upper Amur and the eastern Trans-Baikal area. This is mostly due to the studies by Mazin (1988: 21;

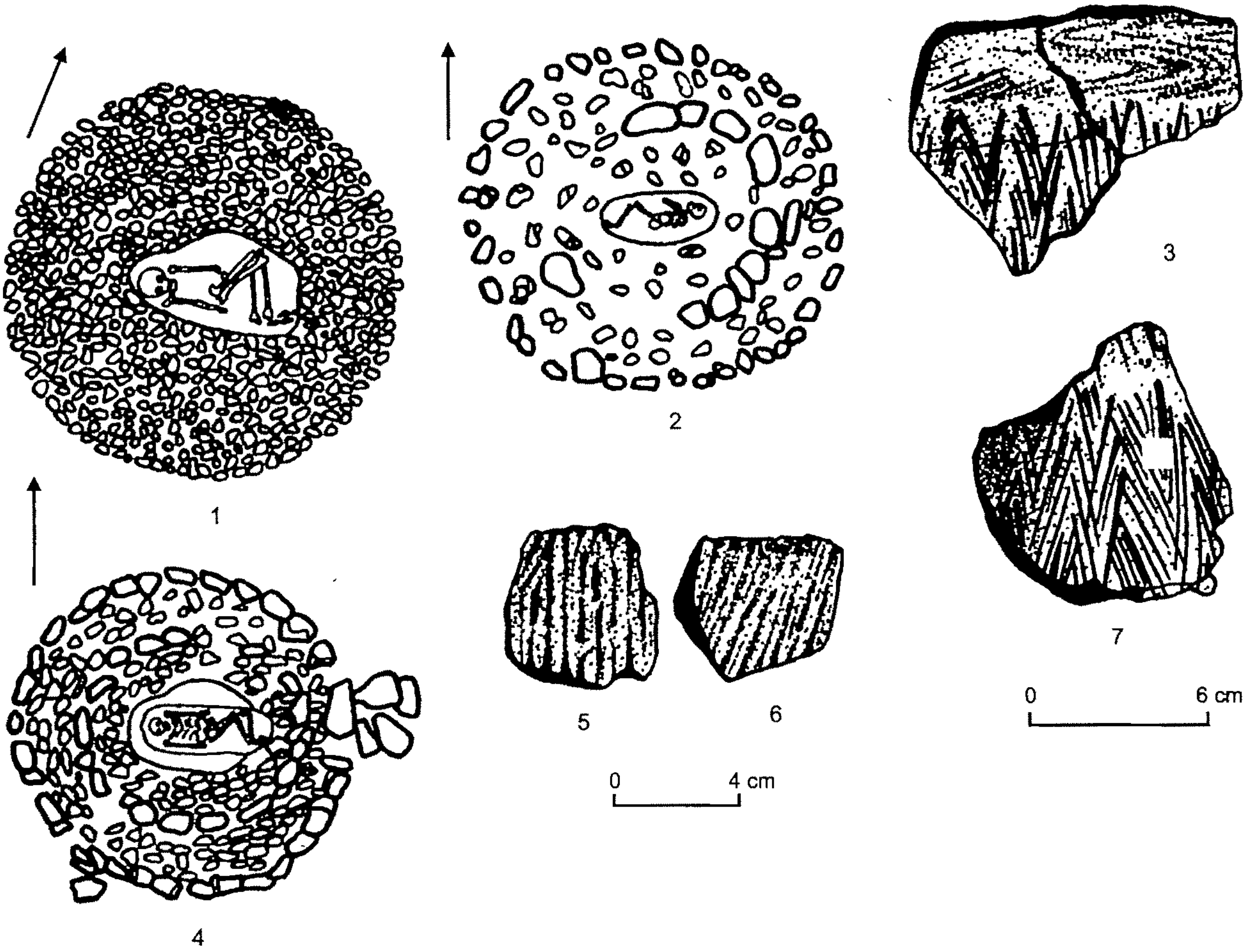

Fig. 7. Plans of Afanasyevo-type mounds in Altan-sandal and Shatar-chuluu burial grounds and pottery from these burials. Western cultural province.
1 – Altan-sandal, mound 3, *2, 5, 6* – Shatar-chuluu, mound 1, *3, 4, 7* – Shatar-chuluu, mound 3
1, 2, 4 – after (Novgorodova, 1989), *3, 5 – 7* – drawn by present author

1994: 81), who separated two groups of Neolithic and Bronze Age petroglyphs, sharply differing in terms of style and motifs· the "taiga petroglyphs" of the forest zone, and the "steppe petroglyphs" of the forest-steppe zone. While the "taiga petroglyphs" are dominated by hunting and reindeer-breeding motifs (Mazin, 1988: 22 – 23, 28, 33, 36; 1994: 83, 95), their "steppe" counterparts are characterized by representations of humans or anthropomorphous beings, enclosures filled in with spots, and regular lines of spots. Mazin (1994: 94; 1988: 25 – 26, 33, 36) finds parallels to petroglyphs of the second group in the steppe parts of the Selenga River Basin, the western Trans-Baikal region, and in northern Mongolia. Altars shaped like enclosures made of slabs and situated near the petroglyphs of the "steppe style," contained, among other finds, bones of domestic animals: mandibles of cows, sheep, and horses (Mazin, 1988: 12; 1994: 73).

Doubtless, petroglyphs of the "steppe style," according to Mazin, or of the "Selenga type", according to Okladnikov (Okladnikov, Zaporozhskaya, 1969, 1970) attest to the production economy that emerged during the developed Neolithic, was practiced by the Onon Culture people (Kirillov I.I., 1981: 23 – 26, 30), and became predominant during the first half of the 2nd millennium BC. By mid-2nd millennium BC, livestock raising already played the leading role (Cybiktarov, 1999: 95 – 97, 99). Petroglyphs of the "steppe style," then, might have been created by the steppe and forest-steppe people of southern Trans-Baikal area and adjoining parts of Mongolia, including populations that practiced production economy in the Early Metal Age.

Eneolithic and Early Bronze Age sites in western Mongolia are entirely different. They belong to the western cultural province. Cairn barrows in Altan-sandal, the Ara-Hangai aimag*, and in Shatar-chuluu, the Bayan-Hongor aimak, contained burials of Caucasoid people lying supine with bent legs in shallow graves Skeletons were covered with ochre, and there were no burial goods. A few artifacts were found among the slabs of the pavements (Fig. 7). A claim made by Volkov (1980) and Novgorodova (1989: 81 – 84) to the effect that these mounds were of the Afanasyevo type has remained unchallenged. The crania of the deceased, too, resembled those of Afanasyevo people (Mamonova, 1980: 73; Tumen, 1985: 4; Alekseev et al., 1987: 226, 238). Both Volkov (1980: 16) and Novgorodova (1989: 85 – 86) noted that the Altan-sandal and Shatar-chuluu mounds were closer to those in Gorny Altai than to those in the Minusinsk Basin Also, they noted other Eneolithic materials similar to those in South Siberia and the Sayano-Altai: Afanasyevo-type pottery (surface finds), staffs with zoomorphous heads, and numerous petroglyphs in western Mongolia. Based on this evidence, Volkov (1980: 16) and Novgorodova (1989: 85 – 88, 118 – 119) concluded that the Eneolithic culture of western Mongolia belonged to a large cultural province that encompassed Tyva, Gorny Altai, and the Minusinsk Basin

Several specialists paid attention to Altan-sandal and Shatar-chuluu mounds with reference to Afanasyevo Culture in the Altai and Tyva. Semenov (1992: 78; 1993: 26, 28) and Savinov (Drevnie kul'tury..., 1994: 134 – 135) suggested that a distinct variant of the Afanasyevo Culture might have existed in Mongolia and Tyva. Molodin (1992: 27; 1993: 40) expressed the view that the Afanasyevo Culture had originated in eastern Central Asia. Single mounds of the Afanasyevo type were excavated by Kyzlasov (1979) in Baidag-Baary and Kyzyl-Khaya, Tyva, and by Mandelstam et al. (1979) and Reva (1995) in Khayirakan.

Our comparative analysis of materials from Altan-sandal, Shatar-chuluu, and Afanasyevo mounds in Gorny Altai and Tyva (Cybiktarov, 2002) has brought us to the following conclusions. While the features of the funerary rite in general are evidently suggestive of Afanasyevo affinities (disregarding the absence of burial goods), the mounds of Altan-sandal and Shatar-chuluu, nevertheless do not present a single complete parallel to Afanasyevo mounds in the Altai. They do, however, display marked similarity (not a complete one, either) with Afanasyevo mounds in Tyva. The most plausible explanation would be that in Mongolia and possibly in Tyva, which borders Mongolia on the north, a local variant of Afanasyevo-type culture emerged in the Eneolithic. It was characterized by certain specific features distinguishing it from other variants. These include flattened cairn barrows, single or double ring-shaped pavements inside the mounds, presence of burial goods between the slabs of the pavements rather than in the grave, the custom of crushing clay vessels with subsequent placement of a few potsherds into the pavements.

The presence of a separate local variant of the Afanasyevo Culture in Mongolia and Tyva accounts for the fact that features typical of Afanasyevo-type burials in Mongolia sporadically occur in the Altai. Thus, burial goods are absent in 13.5 % of cases (calculated according to figures given by Stepanova (1996: 54)), single cairn barrows with double ring-shaped pavements inside occasionally occur, isolated potsherds rather than intact vessels were sometimes placed in the graves, etc. All this might have resulted from contacts between the Afanasyevo people of the Altai and those of Mongolia.

The Eneolithic of western Mongolia is represented by numerous petroglyphic sites revealed by Okladnikov, Volkov, Novgorodova, Dorj, Tseveendorj, Kubarev, Jacobson, and others. The largest rock sanctuaries are situated in the Chulutyn-Gol Valley, western central Mongolia, the principal sites being Chuluut I – III, and VII (Okladnikov, 1981b; Novgorodova, 1984, 1989). A similar site was discovered near Mount Tevsh-uul, southern Uver-Hangai aimag, southern central Mongolia (Okladnikov, 1980; 1981a; Novgorodova, 1984, 1989). One more major center of petroglyphic art representing various epochs, including the Eneolithic, was discovered in the Tsagaan-Salaa and Baga-Oigur basins, Bayan-Ulegey aimag, western Mongolia (Kubarev, 1996b; Kubarev et al., 1997). Eneolithic petroglyphs have been found elsewhere in western and southern Mongolia: in Arabzhakh, southern Gobian aimag, and in Naran-bulak, Ubsu-nur aimag (Novgorodova, 1984). Motifs of rock art include women in childbirth, foremothers, masks, male and female figures with uplifted three-fingered hands, three-tiered representations of females, female reindeer and stag, massive static figures of bulls with horns that are crescent-shaped or directed forward, and goats (Okladnikov, 1980: 91; 1981a, b; Novgorodova, 1984: 40 – 58; 1989: 90 – 104; Kubarev, 1996a: 136, Kubarev et al., 1997: 214).

Petroglyphs are usually dated to the time corresponding to the Okunev stage of the southern Siberian Bronze Age cultural sequence. But some of them may be somewhat older and contemporaneous with Afanasyevo-type mounds in Mongolia and Tyva. Notably, finds from Okunev layers of the Toora-Dash site, Sayan canyon of the Enisei, and human crania

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* Aimag, in Mongolia, an administrative-territorial unit equivalent to a province.

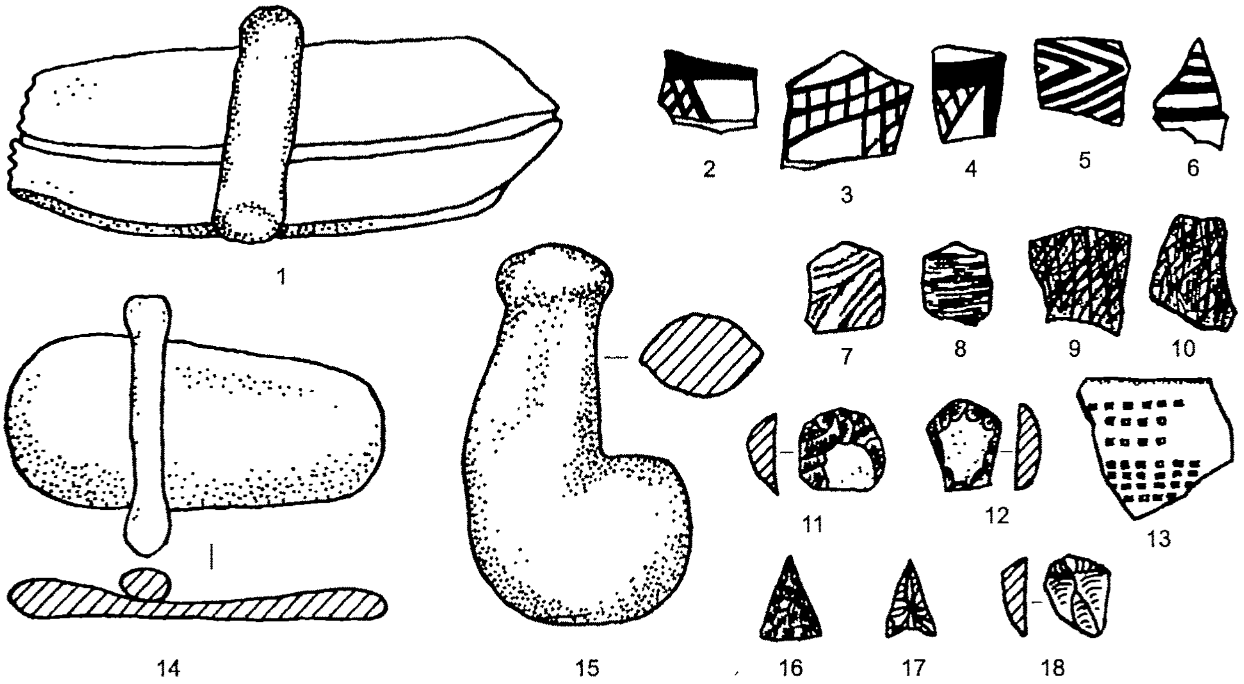

Fig. 8 Artifacts from Neolithic and Eneolithic settlements in Mongolian Gobi (after (Novgorodova, 1989)). Southern cultural province

1 – Eastern Gobi, *2* – *10* – Southern Gobi, Tugrigiyn-shiret; *11*, *16* – Eastern Gobi, Ekhan usny barun enger, *12*, *17*, *18* – Eastern Gobi, Sukhe-Bator aimag; *13* – Eastern Gobi, the Kerulen valley, *14* – Eastern Gobi, Monkh-khan-somon, *15* – Southern Gobi

from the Okunev-type burials of Aymyrlyg suggest that Afanasyevo people participated in the formation of Okunev populations of Tyva which, unlike their neighbors in the Minusinsk Basin, were physically similar to the Afanasyevo people (Semenov, 1992: 83; Gokhman, 1980: 28). It is possible, then, that Okunev people of Tyva performed rites and adored spirits in sanctuaries that had been created by their direct predecessors, the Afanasyevo people of Tyva, who belonged to the eastern Central Asian variant of the Afanasyevo cultural province. Parallels between the motifs of Eneolithic petroglyphs of Tyva and Mongolia have been repeatedly noted by various researchers. Finds from Afanasyevo-type burials, petroglyphs, and surface finds such as pottery, staffs with heads shaped like heads of ungulates (Volkov, 1967: 11, fig. 1 – *6*; 8 – *1*, *7*; 1980: 16; 1989: 87 – 88) suggest that Caucasoid populations were widely distributed across western Mongolia. Ethno-cultural ties of the Afanasyevo people of Mongolia were doubtless oriented mostly to the west and northwest, as evidenced by Afanasyevo-type sites in South Siberia and Xinjiang (Semenov, 1993. 26; Zadneprovsky, 1993: 99 – 100; Molodin, Alkin, 1997; Varenov, 1998).

Regrettably, the mounds of Altan-sandal and Shatar-chuluu have not yielded any materials suggestive of the economy practiced by the Afanasyevo people of Mongolia. A pendant made of a boar tusk found in Shatar-chuluu mound indirectly attests to hunting. The only option, then, is to analyze the economy of the Afanasyevo people inhabiting the adjoining territories – Tyva and the Altai, the more so that western Mongolia resembles these regions in terms of natural environment and climate. In South Siberia, the Afanasyevo people practiced mixed economy combining elements of food production and foraging (Kiselev, 1949; Gryaznov, 1999). Many specialists believe that Afanasyevo people of the Altai practiced mostly livestock raising and hunting, the former being more important (Pogozheva, Molodin, 1980: 97; Abdulganeyev et al., 1982: 66; Tsyb, 1984: 15 – 17). The bones found at the Afanasyevo site of Toora-Dash, Tyva, were mostly those of wild animals, whereas domestic ones were represented by cattle and possibly goats or sheep (Semenov, 1992: 23, 50) Gal'chenko (1994: 18) believes that so far it would be premature to speak of a predominance of pastoralism in the economy of the Afanasyevo people of South Siberia.

The southern cultural province encompassed the Gobian areas of Mongolia and possibly northern China. It is represented by destroyed dune sites with cultural deposits that are only partly preserved and have only occasionally been excavated. The normal practice was that of collecting finds on the surface of the hollows produced by the wind. Nevertheless, some general impression of the province may be gained from these sites (Fig. 8). The most distinctive feature of sites in Mongolian Gobi is pottery with painted decoration (Okladnikov, 1962a: 89). The designs mostly consist of triangles, squares, diamonds, oblique dashes, and "ladders" (Novgorodova, 1989: 59, 77). According to Derevianko, Volkov, and Novgorodova, sites with painted pottery were discovered in various parts of the Gobi (Derevianko, 1986; Volkov, 1967: 10; Novgorodova, 1989: 59, 77).

Another important feature of Gobian sites is the huge number of fragmented querns, grinders, and pestles. Along with hoe-like tools evidently used for breaking up soil, they attest to important changes in economy: the transition to agriculture (Okladnikov, 1962a: 89; Volkov, 1967: 10 – 11; Derevianko, 1986: 246 – 247; Novgorodova, 1989: 59, 77).

The fact that sites are situated in large hollows on the banks of dried-up rivers and lakes (Okladnikov, 1962b: 423; Volkov, 1967: 90; Derevianko, Okladnikov, 1969; Novgorodova, 1989: 59 – 60), along with the results of paleogeographic studies (Vipper et al., 1978: 21 – 22; 1981; 1989: 164 – 165, Dinesman et al., 1989: 198 – 199, fig. 1, 7) indicates that when these sites functioned, the climate was more humid and mild. Neolithic and Early Metal Age inhabitants of the Gobi lived in forest-steppe landscapes with a moderately arid climate (Kryukov et al., 1978: 83; Kuchera, 1986: 291).

Because the cultural deposits have been destroyed, estimating the dates of Gobian sites with painted pottery and tools suggestive of agriculture is quite difficult. Okladnikov (1962a: 88 – 89) and Derevianko (1986: 246) date them to the Late Neolithic– 3rd millennium BC. Volkov (1967· 10 – 11) and Novgorodova (1989: 77), without rejecting this date, do not exclude the possibility that they functioned until the Early Bronze Age (late 3rd – early 2nd millennium BC). In any event, they were largely contemporaneous with both the Afanasyevo stage in South Siberia and the Early Metal Age in the southern Trans-Baikal area.

Occupying a distinct place in eastern Central Asia, sites with painted pottery and agricultural tools mark a specific cultural province that existed in that part of Eurasia during the Neolithic and possibly in the Early Metal Age. It occupied the southern Gobian regions of Mongolia and China, bordering a vast zone of early agricultural societies of East Asia. The fact that in some sites, layers containing painted ware overlie those with pottery analogous to that found in the Cis-Baikal and Trans-Baikal Neolithic sites apparently attests to a northward migration of late Neolithic southern population groups which introduced painted pottery and agriculture to these regions. Absence of sites with painted pottery in eastern, central, and western Mongolian aimags probably attests to a formation of a distinct cultural province in southern Gobian regions of Mongolia and China. Because the Gobian sites are destroyed and the finds were collected on the surface, it is so far impossible to speak of a separate Late Neolithic or Early Metal Age culture in this part of Eastern Central Asia However, the cultural specificity of southern Gobian sites in the context of the Early Metal Age of that region must be taken into account.

Absence of painted ceramics north of the Gobi indicates that people who manufactured this ware did not penetrate further north. This, however, should not be taken to imply that the inhabitants of Mongolian Gobi had no ties with their northern neighbors. However, painted pottery and possibly the increased importance of agriculture were due to contacts with the Neolithic inhabitants of northern China.

Cultural and historic processes in eastern Central Asia at the dawn of the Bronze Age: Tentative conclusions

During the Early Metal Age, four large cultural provinces formed in Mongolia and southern Trans-Baikal area: (1) Selenga-Daurian Culture, (2) Hentei Culture, (3) eastern Central Asian variant of Afanasyevo Culture, and (4) a distinct cultural area in the Gobian zone of Mongolia and northern China (see Fig. 1). Three of them were associated with forest-steppe and steppe zones, and one, with the mountain-taiga regions of the Hentei-Chikoi highland. The differences between these cultures concern ceramics, burial rite, certain categories of tools, and possibly petroglyphic art. The population of each province, then, was culturally distinct, implying ethnic differences. This means that at least three large ethnic groups existed in eastern Central Asia at the dawn of the Bronze Age. Two of them occupied eastern Mongolia and the southern Trans-Baikal area, and the third one, western Mongolia. These groups differed not only culturally, but biologically as well. While people of the Selenga-Daurian and Hentei cultures were Mongoloids, Afanasyevo people were Caucasoids. The eastern Central Asian population, then, was biologically heterogeneous already in the Early Bronze Age.

Virtually nothing indicates that any contact existed between inhabitants of the western and eastern provinces. This may be accounted for by the stability of ethno-cultural situation in eastern Central Asia at the dawn of the Bronze Age, thanks to a relatively high (by the standards of that time) level of economy which made the populations self-sustaining. For that reason, there was no special need to migrate anywhere, populate new territories and extend the economy, thereby increasing the chances of inter-ethnic contacts. Also. restricted mobility of the steppe populations was due to certain features of economic development.

The analysis of the archaeological materials suggests that the Selenga-Daurian and Afanasyevo people practiced a mixed economy. Food production was, at best, as important as was foraging, but it had evidently not yet begun to play the predominant role in the life of steppe and forest-steppe dwellers. It may be assumed that people who had created both the above cultures had not yet accumulated enough expertise in food production that would allow them to abandon foraging in favor of animal breeding or agriculture. The transition to the Early Metal Age in eastern Central Asia did not coincide with the radical shift to food production in either the Selenga-Daurian or the Afanasyevo province. In any event, developments in economy limited population mobility, because food production is usually correlated with sedentism. The level of economy attained by that time, then, did not stimulate migrations and inter-ethnic contacts.

Most economic and cultural ties were established within the provinces and did not transcend their boundaries. The early Metal Age was evidently the time when the village communities of early Mongolian and Trans-Baikalian pastoralists and farmers pursued a relatively isolated existence. Hunting, fishing, and gathering continued to play an important role in economy. Because the environment at that time was still relatively favorable, it is beyond doubt that both the developing food production and the developed foraging made the forest-steppe and steppe human populations sustainable. There was no need to actively extend the habitat and penetrate into territories occupied by alien tribes. In any event, so far we are unaware of any Afanasyevo-type finds in the eastern steppe cultural province and those of the Selenga-Daurian type in the western cultural province. Of course, certain cultural ties, including economic ones, may have existed, especially in borderline areas of the steppes between the provinces, but they were limited.

The geographic position of the provinces described above is consistent with the direction of cultural and ethnic ties of Mongolian and southern Trans-Baikalian populations in the Early Metal Age. People of the Selenga-Daurian and Hentei cultures maintained permanent ties with each other due to the environmental specificity of the northern fringes of eastern Central Asia. The steppe and forest landscapes of southern Trans-Baikal region and northern Mongolia are very patchy. For that reason the distribution areas of stock-raising and agricultural populations of the steppes and those of hunting and fishing populations of the forest were patchy as well. As a result, sharply defined boundaries between the two ethno-cultural provinces of northern Mongolia and southern Trans-Baikal area did not exist, providing for permanent economic, cultural, and probably ethnic ties between these provinces. In contrast, the Afanasyevo people of western Mongolia maintained ties mainly with populations of Gorny Altai, Tyva, and possibly Xinjiang. Their contacts with people of eastern Mongolia are less evident. In the south, both the western and eastern populations contacted the people of the southern province encompassing the Gobian areas of Mongolia and northern China. The fact that pottery of the Cis- and Trans-Baikalian type was found in Gobian sites demonstrates that Gobians maintained ties with northern Mongolia and southern Trans-Baikal area, whereas the presence of painted pottery in the same sites attests to contacts with agricultural populations of northern China.

During the Eneolithic and Early Bronze Age, then, four large cultural provinces formed in northeastern Central Asia. Food-producing economy continued to develop in the steppe and forest-steppe areas. Inhabitants of the forest zone, in contrast, continued to maintain foraging economy. Metal (copper and bronze) artifacts appear in all cultural provinces. The general situation in the region was characterized by political and ethno-cultural stability. Available materials attest to the ties between the populations of adjacent cultural provinces rather than to large-scale migrations within northwestern Central Asia.

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AN ARCHAEOLOGICAL COMPLEX WITH RUNIC INSCRIPTIONS IN KOK-SAY, THE KOCHKOR VALLEY, TIEN SHAN

Introduction

Ancient Turkic runic inscriptions are important sources on the history of Central Asian Turkic-speaking tribes in the early Middle Ages. They contain information about numerous historical events narrated by the Turks themselves and not by foreign visitors (Klyashtorny, 1973: 260). For this reason, every new runic inscription attracts particular attention and becomes a valuable object for study by experts in many fields: specialists in Turkic philology, historians, and archaeologists. Of special interest are runic inscriptions found in regions they have never previously been reported from.

The Tien Shan (the part located in the modern territory of the Republic of Kyrgyzstyan) is one of the regions where Turkic-speaking nomadic peoples established states and used Ancient Turkic writing in the early medieval period. Ancient runic inscriptions were found for the first time in the Talas valley in the Tien Shan as early as the late 19th century. After that, most inscriptions were found in the Talas River basin. Several runes were reported from Lake Ysyk-Kol and the Batken District, Kyrgyzstan. Runic inscriptions from the Talas River were studied by outstanding specialists in Turkic philology from Russia, Kyrgyzstan, Finland, and Turkey. They all proposed their own versions of transcription, translation, dating, and historical interpretation of these written sources (Dzhumagulov, 1987: 9 – 10, 12, 14, 19).

S.G. Klyashtorny dates the Talas runic inscriptions to the second half of the Turgesh state (kaganat) that existed in the Dzhetysu and the Tien Shan, i.e., to AD 716 – 739 (Klyashtorny, 2001: 74). However, I.V. Kormushin, using paleogeographic data, came to the conclusion that the Talas runes originated from late allographs found in the Enisei River Basin (2001: 95). The inscriptions of the Enisei Kyrgyz in the Sayano-Altai region that were prototypes for the Talas runes are commonly dated to the 9th – 10th centuries AD.

In 1998 and 2000, K.Sh. Tabaldiev and O.A. Soltobaev, archeologists from the Kyrgyz State National University, found a series of runic inscriptions in the eastern part of the Kochkor Valley, Tien Shan, during their expedition in search of rock art sites in the locality of Kok-Say. These finds are of great importance not only for the investigation of Ancient Turkic language in Kyrgyzstan due to the fact that they were found in the inner part of the Tien Shan for the first time, but also for historical reconstruction because they are usually accompanied by rock art masterpieces and *tamga* characters (symbols in the form of simple characters, strokes, ticks, etc.). In the vicinity of Kok-Say, there are Ancient Turkic stone figurines and burial grounds.

Preliminary information on runic inscriptions in the Kochkor valley was published by K.Sh. Tabaldiev and O.A. Soltobaev in scientific journals in the Republic of Kyrgyzstan (2001: 69 – 72). These publications attracted the attention of specialists in Central Asian ancient runes. S.G. Klyashtorny and A. Amanzholov proposed their own versions of the transcription, translation, and interpretation of the Kok-Say inscriptions (Klyashtorny, 2001a. 213 – 215; Amanzholov, 2001. 97 – 98).

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Description of the finds

The Kochkor Valley, whose eastern part is called Kok-Say, has an important geographical position in the inner Tien Shan. Mountain ranges separate the Kochkor valley from the Chuya valley and Lake Ysyk-Kol in the north and the Naryn River basin in the south.

The study of sites left by medieval nomadic tribes in the Kochkor Valley began in the late 19th century. Since 1989, burial and funeral complexes and petroglyphs of ancient and medieval nomadic cultures have been systematically studied by archaeologists of the Kyrgyz State University in collaboration with specialists from Russia and Germany.

Excavations of Ancient Turkic burials with horses or rams and funeral enclosures with stone figurines at the sites of Besh-Tash-Koroo I, II, III, Bel-Saz, and Sutuu-Bulak (located between the Kochkor and Naryn valleys) yielded interesting results. On the basis of these data, main stages of the development of the Ancient Turkic culture were characterized, sets of horse harness were reconstructed, and pieces of decorative arts were described (Tabaldiev, 1996: 16 – 24, 70 – 82; Hudiakov, Tabaldiev, Soltobaev, 1997: 142 – 147; Hudiakov, Tabaldiev, 1999: 50 – 58; Tabaldiev, Hudiakov, 1999: 59 – 64; 2000: 68 – 70).

The Kok-Say archaeological complex with its runic inscriptions, *tamga*s, and pictures extends considerably the number of sources on the spiritual culture of Ancient Turkic-speaking nomads that dwelled in the Kochkor Valley in the early Middle Ages. A. Amanzholov denotes the Kok-Say inscriptions as Chuya inscriptions, although they have no connection with the Chuya valley (Amanzholov, 2001: 97).

The Kok-Say runic inscriptions are accompanied by special characters (*tamga*) and the images of horse riders. The horses and birds are depicted in fine pecking technique on vertical or sloping planes of massive slabs located on the north side of the Ukek Range, occurring from the bottom to a vertical part of a hill at a distance of 20 – 100 m from one another from north to south.

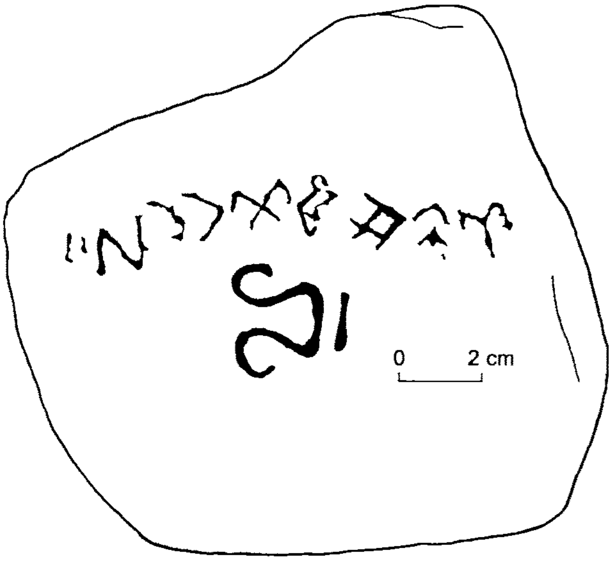

Fig 1 Stone with Inscription 1 Kok-Say.

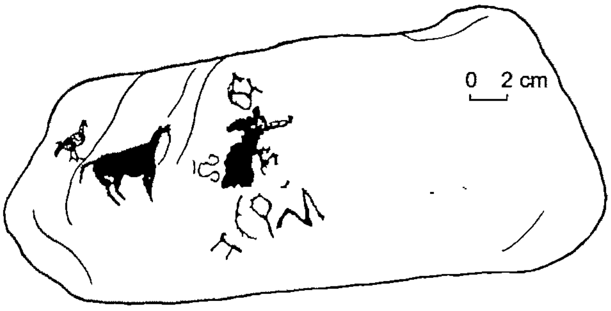

Fig. 2 Stone with Inscription 2 and images of a bird, a horse, and an anthropomorphic figure. Kok-Say

Inscription 1 is depicted horizontally on a massive stone. There are eight runic characters. The translation by S.G. Klyashtorny is "My male name is Adyk (bear). Ten arrows..." (2001b: 74). Below the inscription, there is a *tamga* in the form of a trapezoid bracket with the ends turned up into different sides. There is a horizontal line under the bracket base (Fig. 1).

Inscription 2 is depicted horizontally on a massive oval rock. Several characters in the central part of the inscription have been lost. Above the inscription, there are half-face images of a standing bird, a horse, and a hardly distinguishable anthropomorphic figure in long garments. Between the horse and the anthropomorphic image, there is a *tamga* with a round base and a horizontal line under the base; the ends of this *tamga* are turned into different sides. Unlike the *tamga* from Inscription 1, this character is turned with its base to another side (Fig. 2). Since some of the runic characters have been destroyed, the inscription is "insufficiently clear for reliable translation" (Ibid.).

Inscription 3 is located horizontally on a massive stone, on its patinated side facing west. Below the inscription, in the central part of the plane, there is an image of a rider wearing a shield and a helmet with a battle-axe fastened to the belt, carrying a hunting bird on his hand. Some characters and the bird image have been damaged by erosion. The translation of the inscription by Klyashtorny is identical to Inscription 1: "My male name is Adyk. Ten arrows..." (Ibid.). Obviously, this text can be treated as a caption for the rider image (Fig. 3, 4).

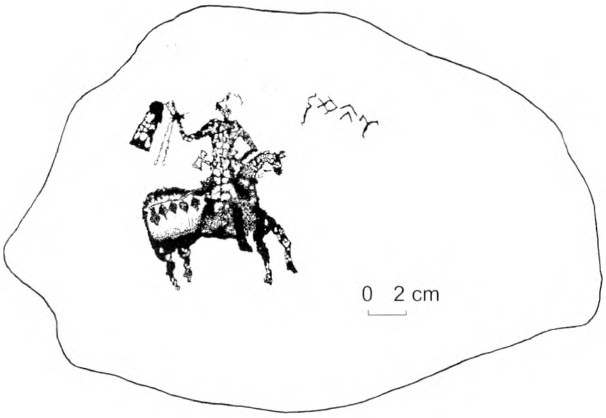

Fig. 3. Stone with Inscription 3 and an image of a rider with a bird on his hand. Kok-Say.

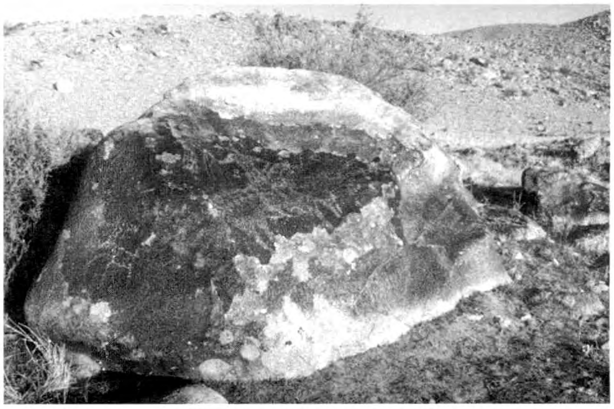

Fig. 4. Stone with Inscription 3 and a rider image. Kok-Say.

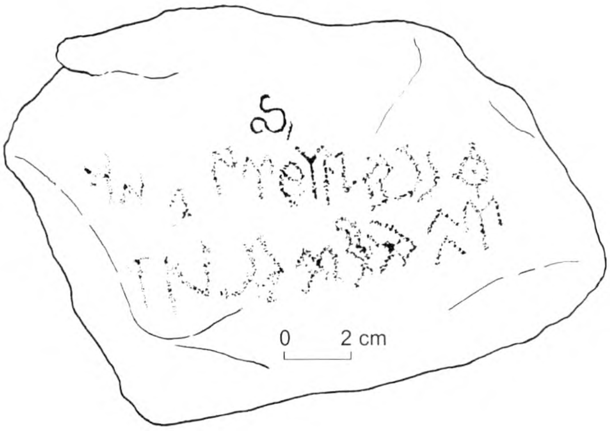

Fig. 5. Stone with Inscription 4. Kok-Say.

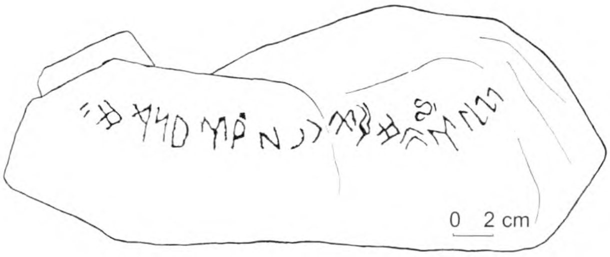

Fig. 6. Stone with Inscription 5. Kok-Say.

Inscription 4 is pecked on the eastern side of a massive boulder. The inscription consists of two horizontal lines. Several characters of the lower line have been lost. Above the inscription, there is a *tamga* with a round base and a horizontal line under the base; the ends of this *tamga* are turned into different sides (Fig. 5).

Translation: "Ahead [i.e., to the east], there is a nomadic camp. My male name is Adyk. Ten arrows..." (Ibid.).

Inscription 5 is placed horizontally on a side surface of a massive oval boulder. Above the inscription, there is a *tamga* with a round base and a horizontal line under the base; the ends of this *tamga* are turned to different sides (Fig. 6).

Translation: "My male name is Adyk. My [our?] Yarysh is in the country of Ten Arrows" (Ibid.).

Inscription 6 contains two runic characters on the opposite side of the stone with Inscription 5. They are depicted vertically in one line (Fig. 7). No translation.

Inscription 7 is placed horizontally on a massive oval boulder. There are 13 characters clearly pecked. One can see a silhouette of one more character not fully preserved. Above the inscription, there is a *tamga* with a round base and a horizontal line under the base; the ends of this *tamga* are turned to different sides (Fig. 8).

Translation: "My male name is Adyk. Our Yarysh is [in the country] of Ten Arrows" (Ibid.).

Inscription 8 is placed horizontally on a massive boulder. It consists of five characters (Fig. 9 – 11).

Translation: "Our Yarysh" (Ibid.).

Inscription 9 is depicted on a boulder surface and consists of five characters placed horizontally (Fig. 12). The characters are identical to the characters of the previous inscription. The transcription of this inscription (without translation) was published by S.G. Klyashtorny (Ibid.). In the translation by A. Amanzholov, the "heroic name" of the persona of the inscriptions sounds differently than in the translation by S.G. Klyashtorny. The author derives the name of Sagunak from the word "*sagun*" that was used to denote "the elders among the Karluks" or "Turkic witch doctors" and relates it to the name of a medieval city of Sugnak or Sygnak (Amanzholov, 2001: 97 – 98).

In 2000, K.Sh. Tabaldiev and O.A. Soltobaev, surveying the site, found one more runic inscription consisting of seven characters pecked not very clearly and partly destroyed. This inscription has not yet been transcribed and translated by specialists (Tabaldiev, Soltobaev, 2001: 72, fig. 10).

The Kok-Say complex with runic inscriptions is not the only example of such sites of early medieval nomads in the eastern part of the Kochkor Valley. There are several Ancient Turkic burial grounds with kurgans, funeral complexes and stone figurines nearby at a distance of 1 – 5 km.

In the area of Kalmak-Tash, Ancient Turkic stelae were once located, which had warriors depicted with vessels in their right hands and sabers and daggers on their belts or a woman wearing a three-horn headdress. These stelae were moved to the village of Kara-Sas by local people. These rock art pieces date to the 7th – 8th centuries, i.e., the time of existence of the Western Turkic and Turgesh states (*kaganats*) (Tabaldiev, Hudiakov, 2000: 68 – 69, 72 – 73).

Tabaldiev studied Ancient Turkic burials with horses, horse burials, single burials of adults and children, and a memorial enclosure at the Bel-Saz site (Tabaldiev, 1996: 20, 22 – 23). They are dated to the 7th – 9th centuries AD.

Ancient Turkic stone figurines were found at the sites of Chap, Boyok-Bulak, and Kyzyl-Bulak. On these figurines, men with broad faces, almond-shaped eyes, wide brows, straight noses, relief mustaches, small mouths, and sharp chins are shown in a low relief technique. Some men are depicted carrying small vessels or bowls in their bent right arms, and their left arms are also bent with palms lying on the belts (Fig. 13, 14).

Some stylistic features attribute these figurines to the 7th – 8th centuries, i.e., to the time of the existence of the West Turkic and Turgesh states (Tabaldiev, Hudiakov, 2000: 72 – 73).

The site of Kok-Say, situated in the eastern part of the Kochkor Valley, which is extremely rich in archaeological monuments of the Ancient Turkic period, is of great interest. Although one runic inscription has been found at the neighboring site of Kalmak-Tash, the Kok-Say inscriptions are of special importance because they contain the same text in different editions that is repeated on separate stones on the side of the Ukek Mountain, covering an area of several hundred square meters. Stones 5 and 7 show the most complete version of the inscription: "My heroic name is Adyk (Bear) Our (my) Yarysh is in the country of Ten Arrows." The remaining seven inscriptions contain the same text in a contracted form, which mentions only the name of the hero, the name of the country, and the characteristic of the valley. Only one inscription, Inscription 4, clarifies that the nomadic camp of the hero is obviously "to the east" of the Yarysh Valley.

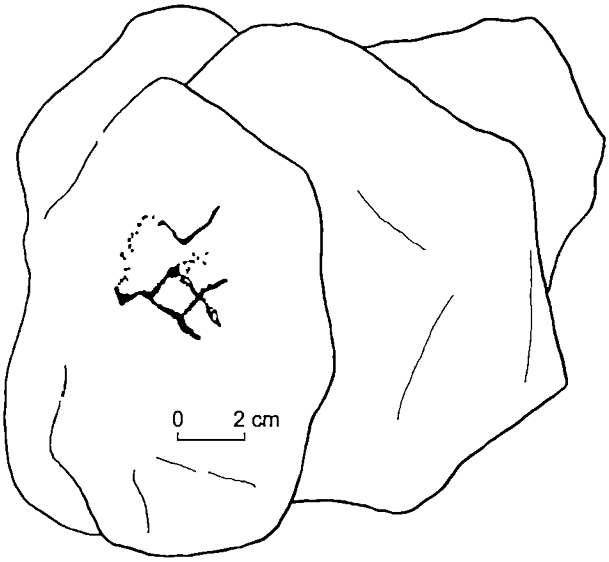

Fig 7 Inscription 6 Kok-Say

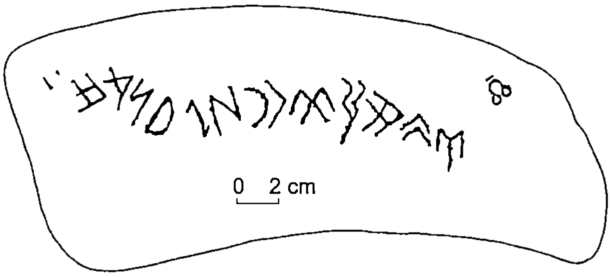

Fig 8. Stone with Inscription 7. Kok-Say

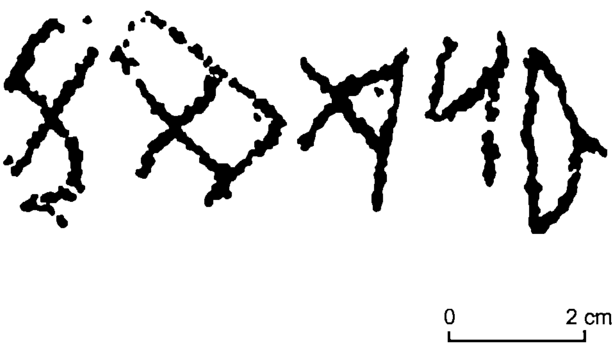

Fig. 9 Stone with Inscription 8. Kok-Say.

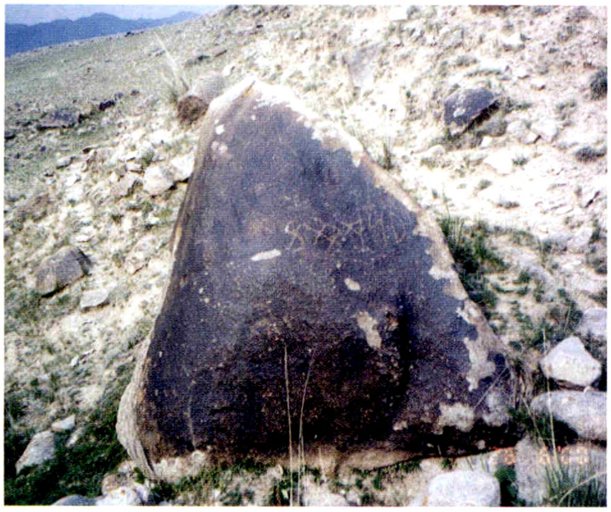

Fig. 10. View of the stone with Inscription 8. Kok-Say.

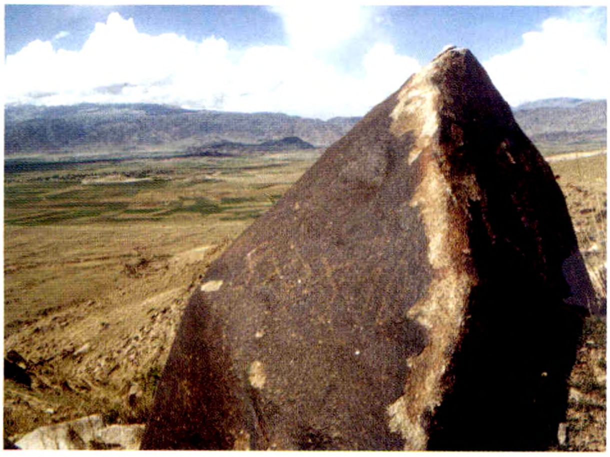

Fig. 11. View of the stone with Inscription 8. Kok-Say.

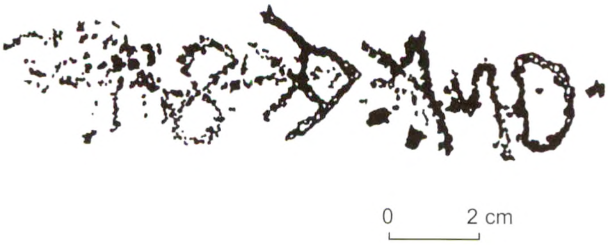

Fig. 12. Stone with Inscription 9. Kok-Say.

The fact that the inscription describes the same person is supported by the *tamga* symbols on stones 1, 2, 4, 5, and 7. Although on some stones these *tamgas* differ slightly and can be turned with their bases into different sides, the *tamga* character proper is undoubtedly the same.

Similar *tamga* characters are reported from sites in other regions of the Republic of Kyrgyzstan. Analogous characters were found among rock art images in the Alay

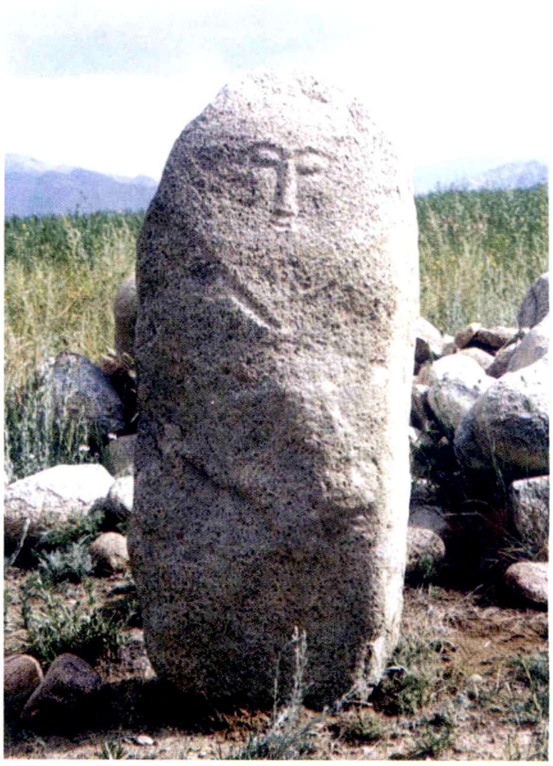

Fig. 13. Stone figurine.

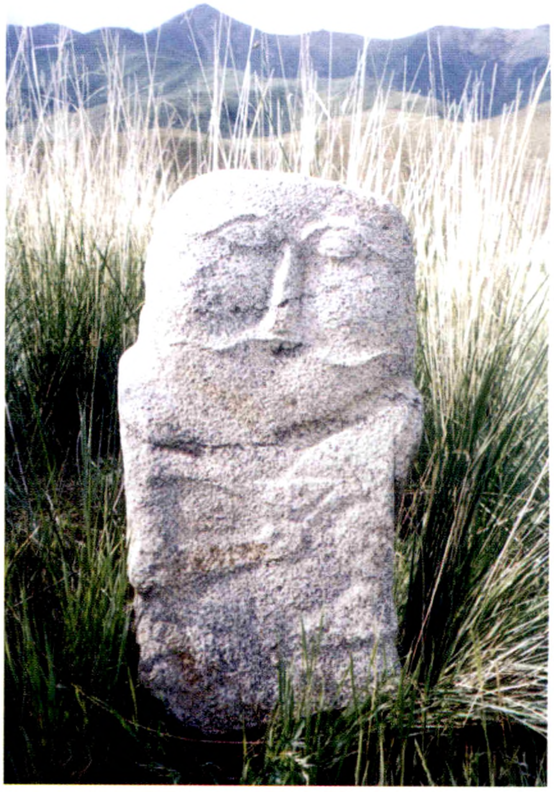

Fig. 14. Stone figurine.

Valley, on the left side of Lake Ysyk-Kol, and at the bottom of the Kungei Ala-Too mountain range (Tabaldiev, Soltobaev, 2001: 71).

Tamga symbols similar in style, with round bases and ends turned into different sides, are reported from sites of various chronological periods in Central Asia, Kazakhstan, the north part of the Black Sea shore, and Mongolia. In western regions, the dominating type of *tamgas* is that with bases down and ends turned up. Scholars relate these symbols to the Iranian-speaking nomadic tribes of the Sarmatians and Yuechi (Wainberg, Novgorodova, 1976: 69 – 72). In the eastern part of the Eurasian steppe zone, similar symbols were depicted with their bases up and ends turned down. The most exact analog to the Kok-Say *tamgas* is a *tamga* with a round base, turned-up ends and a horizontal line below found at the rock art site of Tsagan-Tolgoi in the Khovdo Province, Mongolia (Perlee, 1976: plates 174, 181). This site contains images that belong to various historical epochs from the Bronze Age to medieval times. E.A. Novgorodova dates these *tamgas* to the Xiong-nu period (1984: 118 – 123). Similar *tamgas* with round bases and ends turned up to different sides were widely spread among Turkic and Mongolian-speaking peoples. Amanzholov indicates strong similarity between the Kok-Say symbols and the *tamgas* of the tribal groups of Chokemei and Kangly that are included into the modern Kazakh ethnicity (2001: 97 – 98). Similar *tamgas* have been reported to exist among the Altaians and Mongols (Sagalaev, Oktyabrskaya, 1990: 23, plate 1; Wainberg, Novgorodova, 1976: 71). Analogous *tamgas* are known among the tribes of Bel'tyr and Karga that belong to the modern Khakass (Butanaev, 1990: 208, 219, 231, 234, 248).

We note that the *tamgas* of the Altaians and Mongols are usually depicted with their bases down and ends up, while the Khakass *tamgas* are shown with their bases up and ends down or turned horizontally, similarly to the Kok-Say images.

The zone where the Khakass-type *tamgas* are spread corresponds to the area of ancient *tamgas* in Mongolia, and the zone of the Altaian and Mongolian-type *tamgas* corresponds to ancient *tamga* symbols of the western part of the Eurasian steppe zone. The Kok-Say type is obviously connected with the Tsagan-Tolgoi type from the Mongolian Altai.

We note that "Adyk, a man and a hero" is depicted twice or even three times on the Kok-Say stones. The most elaborate and detailed are the style and technique of the image on the stone with Inscription 3. This is a real petrogliphic portrait of a rider named Adyk with a caption below the image. All scholars paid particular attention to this picture. The body of the hero is depicted en face, and he is riding on a half-face horse that is walking from left to right. The rider is shown with his head turned back wearing a pointed headdress, probably, a helmet with a conical tip with a plume. The man is broad-shouldered and strongly built and has a thin waist. His right arm is bent and his hand is turned up. A large bird is sitting on his palm. The image of the bird has not been completely preserved; one can see only two feet and a tail that widens at the end. A double string or a small strap is hanging from the palm. Obviously, this strap was used to tie the feet of the hunting bird. The rider holds the reins with his bent left hand. On his body, there are wide rectangular plates. Most probably, the rider is wearing a plate armor-*kuyak* extending to his knees. Behind his back, the man has a battle-axe with a high head and a straight hilt. Probably, it is fastened with a strap to his belt. On the left side of the rider, there is a slight prominence, which could have been the hilt of a saber or sword. The rider's legs are stretched and his feet are hanging lower than the horse's body. The horse has a small head, sharp ears, a thin bent neck, and reins. The horse's body and croup are exaggeratedly large A strap with five large plaques of rhomboid or heart-shaped forms is shown on the croup. The left foreleg is slightly bent and the other legs are straight (see Fig. 3, 4).

The picture is made in the technique of fine pecking; the details are shown clearly and worked elaborately.

An image similar in composition and technique is pecked on the surface of a massive stone located at a distance of one hundred meters to the west of the stone with Inscription 3 and shows a man with a mountain bird riding on a horse. It has not been preserved completely and was not produced so elaborately. The rider is shown with his body turned back; a hunting bird is sitting on his right hand and he holds the rein in his left hand. The depictions of the rider's helmet and the legs of the horse were not preserved, the armor of the warrior was not shown in much detail, and his axe was not shown at all. However, the figure of the sitting bird was preserved completely. It has a small head with a hooked bill and a crest, a thin neck, and a large body (Fig. 15).

The same man-warrior (but already dismounted) is obviously depicted in the composition on the stone with Inscription 2 This anthropomorphic image is not clearly seen. Probably, the artist depicted a warrior on bended knee shooting from a bow. In any case, this silhouette reminds us of some details typical of the images of dismounted archers. Behind this figure, there is a horse with hanging reins. Its forelegs are joined together, probably tied. Behind the horse, there is a standing bird (see Fig. 2). Klyashtorny suggests that the bird sitting on the hand is a peacock, and the whole picture is related to Sogdian art (2001a: 214 – 215). We believe that it is more reasonable to consider this bird to be a hunting one, for example a golden eagle, and to relate the composition to a hunting episode. In this case, all three Kok-Say stones illustrate various episodes of the hunt of "Adyk, a man

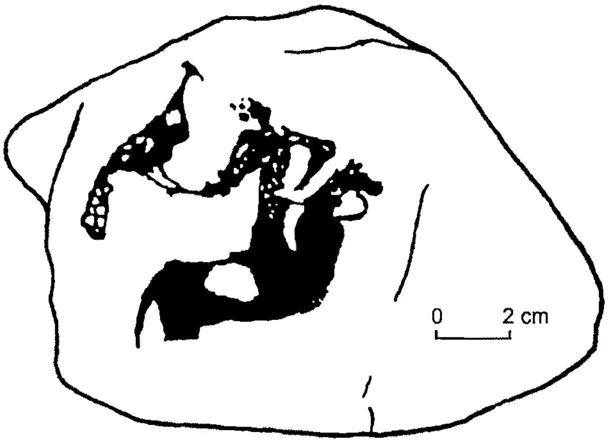

Fig. 15. Stone with an image of a rider with a bird on his hand. Kok-Say

and a hero." We also have no obvious reasons to think that the "horse croup is covered with a rug horsecloth and there is no saddle" (Klyashtorny, 2001b: 74) or the man is riding on "an armored war horse" (Amanzholov, 2001: 98) The strap with hanging plaques fastened under the neck suggests that the Adyk's horse has neither a rug nor a protective horsecloth. In addition, it is not easy to hunt on a horse covered with a horsecloth in the mountains.

The figure of "Adyk, a man and a hero" differs in some detail from traditional images of Ancient Turkic mounted and dismounted warriors who were shown with long hair waving behind the back, either loose or woven in thin plaits (Hudiakov, 1986. fig 72, *3*, *4*; Hudiakov, Tabaldiev, Soltobaev, 1997: fig. 2, *1*). In Sogdian art, Turkic men have a similar appearance (Mogilnikov, 1981: fig. 22, *1*, *2*, *8*). In comparison with the Kok-Say warrior, Ancient Turkic armored riders on Mongolian petroglyphs were also shown in a different manner: they have horned helmets, long cataphracts, and horses covered with armor clothes (Novgorodova, 1984: fig. 60).

The armored Kok-Say rider has some features in common with a mounted warrior from the Sulek rock art gallery in Khakassia whose body is depicted *en face* and who is sheathed in armor and wearing a helmet with a plume. Owing to the technique of carved engraving and a contour manner, the Sulek rider is depicted in much detail (Hudiakov, 1980: plate LI). Some elements of the Kok-Say image, such as plate armor and large hanging plaques on a horse strap, might belong to a later period than the time of the Turgesh state.

The historical interpretation of the Kok-Say complex needs to be corrected. As Klyashtorny believes, the Kok-Say inscriptions that contain names of a person and a place must correspond to the place of a winter camp of a landowner. Klyashtorny studied inscriptions with analogous meanings in Southern and Eastern Mongolia, the Gobi Desert, and the Khengei Region (Klyashtorny, 1978: 157 – 158), "The same phrase was repeated many times, obviously every year, and brief inscriptions consisting of large characters were pecked on visible places" (Klyashtorny, 2001b: 75). The author does not explain why Ancient Turks had to inscribe the same text on visible places every year if previous inscriptions, which indicated the fact of the presence of a landowner, remained intact and could be clearly seen. In addition, these texts mention not a nomadic temporary camp but "our Yarysh," i.e., the whole Kochkor Valley, and note that the territory or the camp of Adyk is not in Kok-Say but "to the east" of Kok-Say (Ibid.: 74).

We suppose that Adyk, a man–warrior, had to claim in a written form his ownership of the valley of "Yarysh in the country of Ten Arrows" because in real life this valley, being a disputed territory, did not belong to him, and he claimed not only a part of the rocky hillside of the Ukek Range, but the whole Kochkor Valley. However, this hero could actually claim for his ownership only during his short-term campaigns in the eastern part of the valley, and he came there from his camp, located to the east of Yarysh in the Eastern Tien Shan.

We can hardly agree with Klyashtorny that the phrase "our Yarysh in the country of Ten Arrows" testifies to the Turgesh citizenship of Adyk, who seems to speak "on behalf of the state" – Turgesh kaganat (Ibid.: 75). More probably, his phrase declares the right of a conqueror and can be understood as follows: "I am the man–warrior Adyk. The valley of Yarysh in the country of Ten Arrow is now ours (mine). I came from my camp to the east." Obviously, Adyk thought the Yarysh valley to be his hunting ground because he was depicted with a hunting bird on his hand.

We should also note the "heroic name" of Adyk – "Bear." It would have been unlikely for a Turgesh noble warrior whose ancestors had dwelled in the Tien Shan Mountains and Dzhetysu for about two centuries to choose a heroic name after an animal inhabiting the northern taiga. Certainly, heroic names were not necessarily taken after only local animals; frightening nicknames were often given to warriors in those countries where there were no lions, tigers, or other savage predators. However, prior to giving the name of Bear, it would have been necessary to know about this beast, real or mythical.

Conclusion

Thus, as evidence shows, "man-warrior Adyk" had multiple campaigns to the Yarysh Valley because he wanted to conquer and include this valley into his hunting ground. He expressed his claims in a written form and supported these inscriptions by his personal *tamgas* and portraits on the stones of Kok-Say, which have been preserved in the eastern part of the valley. These events took place when the valley had the Turkic name of Yarysh and belonged to the Turgesh kaganat before or exactly at the time of Adyk's campaigns. Adyk got his heroic male name because the bear was a respected animal among ancient people, and this name was appropriate for an adult man. Adyk, the warrior, came to the Yarysh Valley from the east, or to be more exact, from the eastern Tien Shan, the place of his nomadic camp. Probably, his relatives or ancestors once inhabited the Mongolian Altai (*tamgas* of the Kok-Say type were found on stones of Tsagan-Tolgoi).

Adyk's ancestors dwelled in places where the bear was a respected animal, a master of the taiga, and then they obviously moved to the eastern Tien Shan, passing through the Mongolian Altai. If we assume that the runic inscriptions in the Tien Shan are younger than the Enisei ones, Adyk's campaigns to the Yarysh Valley took place during a period after the separation of the entire Kyrgyz ethnicity into two branches, the Enisei and East Turkestan ones. This which followed the Kidan conquest of Central Asia in the first quarter of the 10th century that accomplished the epoch of Kyrgyz rule.

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ETHNOLOGY

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THE EVENKIAN RITUAL OF "BEAR SENDOFFS" AS A FORM OF TERRITORIAL ORGANIZATION

The mythological perception of the bear image and the set of relevant ritual ceremonies, the Bear Feast, which includes a bear sendoff ritual ("head disposal"), constitute an integral part of the ideology of the indigenous hunter-fishermen of the Siberian Taiga region. Literature focusing on this set of mythological ideas usually describes rituals included in the "bear feast" as a cult linked with game hunting, ancestors, or magic rituals of sacred animal worship (Mify..., 1992: 128 – 130; Freser, 1984: 473 – 485).

Apparently, the rituals of the "bear feast," as they were recorded in the 19th – 20th centuries, were not included into shaman mysteries; however, they turned out to be contaminated with traits of shaman cosmogony. In this respect, the "bear feast" and especially "head disposal" as its culmination may be considered in the same way as the shaman cycle of calendar rites included in the spring festival of *ikenipke* aiming at replicating a "cosmic order" and "relationships" between a human community and a "macro-world of superior ghosts" responsible for organization of "a living space" of a local human community and confirming their rights on the communal family lands.

Original information about the "bear feast" was obtained in 1972 and 1978 during interviews with indigenous people of northern and southern dialect-territorial groups. The southern group (its administrative name is Mendezinkur) populated the Chuna River basin (a left tributary of the Angara River) and included a few families (about 40 individuals) until the 1960s. The author witnessed the ritual of "head disposal" of a killed bear performed by one of the last representatives of this group, E.I. Rukosuieva (born in 1914). The report on the ritual and relevant information and narrations on similar rituals performed in the past (interviewees: sisters E.I. and N.I. Rukosuieva) was published shortly after (Turov, 1978).

In short, the rite consisted of the following actions. The skinned head of a bear was disjoined from the body at the third cervical vertebra. A planed wooden peg was inserted into the open mouth as a crossbar, and twigs of fur-tree were put into its nose. The interviewees explained that such precautions were taken "not to let the bear catch anybody" (the peg will prevent the bear from closing its mouth, so it will not be able to catch a human being) and "smell hunters."

Apparently, the ritual of "head disposal" and the stated precautions are linked with the ideas of the Evenks about the "revival" of a killed animal who could revenge itself upon "offenders." Standard actions that were, as the interviewees put it, "set by the tradition of the ancestors," may likely be explained as such protective measures. The head prepared for "disposal" was carried about 50 – 60 m away from the place of butchering towards the place "from where the animal had come." The head was usually placed on a stump (in our case, a pine tree of around 15 – 20 cm in diameter was felled) about 1.5 m high facing the direction "from where the animal had come." Notches were made numbering the bear's age on trees standing along the same direction at a level slightly exceeding average human height. E.I. Rukosueva explained that "it helped *amaka* (the bear) see its path; the bear went away, became alive again, and would not be angry with the Evenks."

The interviewees told that certain parts of bear's body (*ost penis*, a foot with skin) probably together with its stylized image made of metal or bone, were kept within a set of "family protectors." The usage of a "bear foot" as a stick in the shaman's tambourine testifies to its sacral

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significance. The tradition to keep *ost penis* (' a special bone" as the interviewees described it) among ritual objects seems to go back in the remote past as an integral feature of human psychology and convergent repetition of stereotypes of mythological perception. Stylized bear images recovered from the Angara Basin burials may be recorded as analogues as well as three specimens of *ossa penis* uncovered among other non-published grave goods at a Neolithic burial on Lake Baikal by V.I. Bazaliisky.

The Evenks of the Angara River basin believed that a bear follows its own path, a human has a separate track; for that reason the Evenks did not kill bears without necessity. Semantically similar ideas were recorded by S.M. Shirokogorov (1923). According to the data recorded from the Evenks inhabiting the Amur River basin, certain relationships had been established between the bear and humans, resulting in the formation of a specific "taiga community" with its own regulations and behavioral norms. The differentiation between bear and human habitats fixed in beliefs may have served as a reason "for many Tungus people to regard certain rivers prohibited for humans" because they belong to bears (Ibid.: 72). According to E.A. Kreinovich (1973) who witnessed a Nivkhe bear feast, people used to designate the bear with the words "a mountain man, a neighbor."

It seems reasonable to believe that Amurian Evenk perceptions of the bear image as a competitor to humans and a representative of a "neighboring group," as it was recorded by S.M. Shirokogorov, had been formed as a result of Evenk's contacts with the "pre-Tungus," an aboriginal population speaking a Nivkhean language G.M. Vasilevich (1969. 216) argued that allegorical names of a bear, i.e., *mangi*, *ngamend'u*, and *torgand'u*, originated in the dialects of the Evenks inhabiting the Upper Lena River, the North Baikal area, and certain regions of the Podkamennaya Tunguska and the Okhotsk Sea in the form of a borrowing from the "pre-Tungus" population together with the idea of the bear as an ancestor. Available data, both our own and recorded by other authors, allows us to infer that the sacral image of bear is associated in the traditional perception of the Evenk people not only with an idea of an ancestor (which is suggested by the allegorical name of *amaka*), but also with some mythical aboriginal population or alien neighbors, and represents an integral part in the cultures of all dialect groups populating the territory west of the Amur Basin.

Apparently, the "bear cult" practices and beliefs connected with bears represent the relics of mythological consciousness in the ideological system of the "Russified" Evenks in the western Angara region. Interviewees told that success in bear hunting was recognized as a good sign under certain circumstances. Thus, a beast that had come to a village and had not been afraid either of dogs' barking, people's shouting, smoke, or blank shots was regarded as a herald of good luck, while an aggression of full bears during summer hunting raids foretold misfortune. It cannot be excluded that in the Evenkian traditional system a beast wandering into a village was associated with a guest, and the traditionally prescribed killing of this animal was connected with the idea of welcoming a guest bringing luck. On the other hand, a full bear's aggression may be perceived as a challenge to fight, which turning down means to concede a "family right" of hunting grounds to the wild animal.

Available materials on the Evenkian "bear feasts" show that bears were not regarded as hunting prey in the same way as ungulates or fur-bearing animals were. All researchers reported that bear killing was usually a result of an accidental discovery of a bear's den within "family hunting grounds," and the "bear feast" was held only on the occasion of killing a bear in its den.

In this context, the only case of a ritual "bear's head disposal" recorded by the present author from the Angara-Chuna ethnic group of Evenks seems to fall out of the standard set of rituals involved in the "bear feast," because rituals were performed on a wild animal that had not been killed in its den. However, comparisons of the observed ritual actions with "classical" records have shown that an atypical nature of the described situation was compensated by a concordance noted in details of E.I. Rukosuieva's actions with standard behavior at the "head disposal" ritual typical for the "bear feast."

The ritual behavior described here, as other records, testifies to the fact that the semantics of this ritual are different from those of a "game hunting cult" or "ancestor cult." Rukosuieva's behavior while performing the ritual of "head disposal" attracted our attention. She said as if disapproving of the killed animal: "You, bad thing, we have been chasing after that moose [a moose that was killed by the bear – **M.T.**] from far away for a week already, and you have come first." The interviewee was mostly satisfied with the fact that her *last* bullet (Rukosuieva stressed this fact) had struck the bear after many shots. All the noted details together suggest that the killed animal was regarded as a rival, and a non-standard performance of the "head disposal" symbolized the victory of a "real owner of the hunting grounds" and secured his primary right to the available resources.

Russian experts in Evenkian ethnology have published quite a number of works describing a whole set of rituals connected with bears (Anisimov, 1958; Vasilevich, 1936, 1969, 1971; Vasiliev, 1948). A detailed analysis of the provided information is not incurred in the theme of the present paper; that is why we are going to highlight only those details that support our interpretation of the bear image and the meaning of the "head disposal" ritual as the final portion of the "bear feast."

We agree with G.M. Vasilevich in her arguments that numerous allegorical names of a bear (in fact, this concerns all animals described in the Evenkian cosmogonical myths) should be regarded as "cognate terms without possessive suffixes." Consequently, we are allowed to suppose that a bear, just as other sacral animals (moose, deer, wolf, raven, etc.) late in the 19th and in the 20th centuries was hardly perceived as an ancestral totem by the Evenks. We believe that terminological categories of "relationship classification," i.e., the category of the age group "everybody who is older than me," better conform to characteristics of the Evenkian traditional religion reflecting "social" relationships between bears and humans. Such names of a bear as *amaka*, *oneko*, *atyrkanna*, *etyrken*, *ama*, and *ene* are likely classified as an age category of "old people – grandfathers – grandmothers – fathers – mothers" in general, without designations of any family relations, that is why no suffixes are used to show personal attribution.

We think that the following fact may be regarded as an indirect testimony to the suggested "classification" characteristics of relationships between a bear and "a real man, an Evenk." Meat from bear's head was a taboo only for women during their reproductive age. The reason for that is likely associated with the Evenkian mythological subject of "marriage relations" between a bear and a girl named Heladan, who accidentally found herself in a "bear's camp" and lived there till spring as a member of this community of bears with certain human properties (Vasilevich, 1936: 38 – 40).

All known stories of this type share one important feature. Over some time, the wild animal caused Heladan to kill him and place his head in the "*malu*" (a sacred place in the *choum* (a portable dwelling) behind the hearth opposite the entrance). Upon fulfilling this and other orders of the bear, Heladan found a young and healthy man in her bed the following morning and after a fixed time two babies were born to her. Thus we may hypothesize that in the Evenkian mythological system, the head of not only a mythical but also a real bear killed in its den was linked with the image of a living, able-bodied deputy of a real creature. Such a supposition is likely a reason why a pubescent woman (especially a pregnant one) is prohibited to eat meat from bear's head. Otherwise, she would give birth to a baby with a "bear mark" – a large birthmark on the face. In the Evenkian mythology, a bear is treated as a possible marriage partner for women in their exogamic society and is regarded as a representative of an alien community not linked with family relations with humans

The accumulated array of facts concerning the "bear cult" allows us to infer that the bear is represented by several anthropo-zoomorphic images in the Evenkian religious system. The bear is regarded as: (1) the first inhabitant of the earth, (2) a trickster; (3) a rival with whom the Evenks fight for hunting grounds; (4) a god- and humanlike creature participating in the creation of the Universe; and (5) a creature possessing certain features of a werewolf. Such perceptions of the image of bear are suggested by the West Evenkian myths and fairytales Two opposing heroes: a human and a bear, belong to communities of different origin. The former identifies himself with the genus of "real humans" on the basis of a purely anthropological feature: the form of his eyes, and calls himself and other people of his tribe as "*Evuniki ~ evenki ~ evenki esachi*," meaning 'with transversal eyes' (Vasilevich, 1969: 217; 1971: 157; Sravnitelnyi slovar..., 1977: 435). The bear, stressing his disparaging attitude towards physically weaker humans, called an Evenk as "a stump with transversal eyes" in his talks with other animals and with the "real man" himself (Vasilevich, 1936: 16 – 17).

Identification of humans and animals only on the basis of anthropological features seems to be suggestive of the idea that bears and humans with transversal eyes, '*Evenks esachi*,' are regarded in the Evenkian folklore as representatives of "ethnically" diverse communities developing neighboring hunting grounds. We agree with Vasilevich in her arguments concerning the Evenkian ideas about the family relations between humans and bears. She argued that neither mythological folklore nor cosmogonic ideas of the Evenks contain any confirmation of their kinship (e.g., (Vasilevich, 1971: 159)). She did not agree with A.F. Anisimov (1958: 70 – 71) who made an attempt to establish links between the common bear name *mangi* with the semantics of "family predecessors" of one of the Evenkian territorial communities.

Anisimov, in his attempt to etymologize the term *mangi*, cited the works by E.I. Titov (1923: 96) on the Evenks of the West Baikal Lake basin. In his work, Titov referred to the concept of a dual (anthropo-zoomorphic) nature of bears. The Evenks regard bear as "the first inhabitant of the earth, a predecessor of humans" (Anisimov, 1950: 311). Indirect arguments indicate that the former meaning of the term "predecessor" differed from its contemporary genetic connotation. They can be found in the collection of records of the Evenkian folklore of various times (Vasilevich, 1936) including the works of many researchers of Tungus ethnology. For instance, text 30 holds that a bear represents one of the first pieces of work of the supreme creator (creator's names are *Seveki – Khevekı – Sheveki*, *Main*, *Amaka*, and *Buga* in different dialects). Later, the bear turned into the devil *Hargi* and became a master of the Lower World, the realm of the deceased from where no one could return (Ibid : 29 – 30). It is noteworthy that this myth reflects a sequence of acts in the creation of the Universe, and establishes, on the one hand, the norms regulating relationships between humans and animals, and on the other hand, between "divine" representatives of the Upper and Lower realms and the inhabitants of the Middle World. Within the established sequence, the bear "who was a human in those times" arrived to the "new earth" prior to "real humans," the Evenks. Hence, the bear is regarded as the first inhabitant of the earth in the ethnic folklore. A mythological story recorded by V.I. Levin from the Evenks of the Aian basin (Ibid.: 216) rendered the same topic

In the abovementioned collection, E.I. Titov in the preface to the "Materials on the Folklore of the West Baikal Evenks" recorded in the Upper Lena, Vitim, Kirenga, and Nerch basins, stated that the Lena and North Baikal Evenks used the word *mangi* to designate two images: a giant hunter chasing the cosmic moose *Hoglen* (the Milky Way is the track of the *Mangi* hunter), and a generic term for a bear (Ibid.: 162). Within this context, a statement by G.M. Vasilevich is noteworthy. She argued that in certain variants of cosmogonic myths about the creation of the Middle World, the bear, as well as other animals "who were able to speak" (dog, raven, and wolf in the ethnic groups of the Aldan and Ilimpeya Evenks), helped the "Supreme Ghost and Creator Seveki" create a human being (Vasilevich, 1969: 215).

In all appearances, A.F. Anisimov's phrase referring a bear as "the first inhabitant of the earth and a predecessor of humans" should be subdivided into two semantically different parts. G.M. Vasilevich disagreed with that part of this attribution, which deals with A.F. Anisimov's viewpoint that the Evenks of the Podkamennaya Tunguska basin perceived bear as their "genetic ancestor." All her long-term research of the Evenkian religious system did not provide evidence in favor of this hypothesis. Consequently, we do not agree with B.A. Vasiliev's interpretation of the Okhotsk Evenks and Orochi's designation of a bear as "our brother" in terms of family relations (1948: 80 – 81).

We believe that there is evidence that allows correlation of the bear name *Mangi* with the image of a devil as the master of the Lower World. The myth about Heladan seems to provide testimony to the adequacy of such interpretation. The story is about the Evenkian girl Heladan traveling along the shaman river *engdekit*. Only shamans are able to make trips along the *engdekit*, during which a hero visits the realm of the dead and returns back to the world of living creatures, so the image of Heladan is correlated to the images of legendary women-shamans who lived in the "times immemorial when the earth was still growing" (i.e., when the existing regulations of life were being established). In such a case, the "events described in the myth" precede those events that are rendered in stories about historical developments and everyday life. In our point of view, the final portion of the myth supports this sequence. Heladan got deer, major household utensils, and "precepts" concerning the ritual of the "bear feast."

According to the shaman's cosmogony, the entrance to the Lower World is located over the ninth rapid at the *engdekit* (Vasilevich, 1969: 213). Heladan landed exactly over the ninth rapid and found herself in the realm of "monsters," who did not understand her language (a stereotypic idea of a foreigner). It was a "village of bears." Heladan married one of the bears and gave birth to two sons (the younger was a human, the elder was a bear). The story holds about their duel and the victory of the younger over the elder, the natural consequence of which was the elder bear-son going away into the realm of the dead (*buni*; *ulamrak* literally = "charcoal black"; *chungudek* = "a place of navel, a central place"; *dolbonitki* = "towards the night"). This story seems to be well correlated with a cosmogonic myth about the creation of the Universe, in which the younger son *Seveki – Eksheri* has become the supreme god, while the elder son *Mangi – Hargi* has become a rival of the former and a master of the Lower World doing all possible harm.

Supposedly, the myth about Heladan's trip representing a variant of cosmogonic myths provides two sets of implications: explanations of origin of the major components of the everyday culture of the Evenks, and suggestions concerning the regular relationships and links between humans and forces of the macro-world that have been established by the initial period of "creation of the cosmos." In this context, the concepts of "*evenki ~ evenki* = "real people," "Heladan's younger son," and "Seveki, the younger brother, a master of the Upper World" seems to form a single series of cultural heroes, who, through combat with their elder opponents, including Heladan's elder son who turned into a bear, have won the "supreme right" to develop the "Middle World."

In this respect, the second part of A.F. Anisimov's phrase about a "predecessor of humans" seems to be subordinate to the first part, namely the "first inhabitant of the earth." It may indicate that the term "predecessor" corresponds mostly to the idea of a creature preceding humans and participating in humans' "creation." Common features in the appearances of humans and bears (note, that bear is often called "big man" not only in myths but also in everyday speech) and personification of animals in the Evenkian tales, a method stereotypical for ancient folklore in general, seems to form the background of the image of bear as the first human on the earth, whose "second, human nature" becomes evident both in his "human-like" behavior and in his ability to assume a human-like appearance among people. Within such an understanding, the primary set of semantic meanings – "brother," "ancestor" – may have an additional connotation of "alike, similar to people" though "alien, foreign."

The suggested semantics of the bear image seem reasonable because in the Evenkian stories about heroes and everyday life both their neighbors speaking other languages and Evenks from other territorial communities are designated with such terms as "monsters" and *chuguldy*, *mangi* (!), *changit*, *deptyly*, all typical attributes of a bear meaning 'rival', 'strong man', and 'ogre'. It is commonly known that "wild people – predecessors of real humans – *ilel*, *evenkil*" are portrayed in the Evenkian folklore as anthropo-zoomorphic creatures. In the Chiringda Evenkian tales, the legendary images of alien *ngamend'i* are usually perceived as bears. They are described as "invisible people, their voices cannot be heard..., they may take everything and this object is gone." The noted associations testify to the fact that real neighbors of the Evenks of different ethnic origin were interpreted in the Evenkian mythology together with other alien things and combined with the bear image possessing a dual nature (Ibid.: 212).

It seems that in the Evenkian mythology the bear image falls within a set of concepts of foreign, potentially hostile things including neighbors-foreigners *mangi* ~ *torgand'i*, neighbors in general, and the first inhabitants of the Middle World, in which the bear was a primary human-like creature who explored and occupied the earth following *Seli*, a mammoth, *Diabdar*, a giant serpent, and *Kalir*, a giant deer with iron antlers and eight legs. This supposition is supported by an inference by S.M. Shirokogorov (1923: 73 – 74). He inferred that people participated in a sort of "taiga community" for economic developing of hunting grounds together with animals. He described his assumptions on the example of the taiga regions of North Manchuria, which are exploited by two subspecies of bear, tigers, and people. Each party rests its subsistence strategy on the constant change of "seasonal hunting grounds," "the great [black – **M.T.**] bear going first and having the best grounds, followed by a tiger, who competes with the former. Worse places are occupied by a small brown bear, and at last, the Tungus-hunters." The latter, having understood the principles of territory division [between animals – **M.T.**] willingly participated in combat [animals' fighting for hunting grounds – **M.T.**]. In the end, "the hunter kills both opponents," securing the territory for himself

Similar examples of symbolic combat for estates have been noted in our observations and in G.M. Vasilevich's publications. Ritual behavior reflecting such an opposition is linked with corresponding mythological plots both logically and mentally. For instance, a hunter having noticed signs of bear's claw on a tree, takes it as a challenge and makes his own scratch higher than bear's notch. The bear makes its notch still higher, thus this interchange of scratches (by the man and the animal) reached the top of the tree or else the tree was partially cut down so that it bended to the ground (Vasilevich, 1969: 217). Out interviewees were absolutely convinced in the necessity of these actions because they would show the wild animal who was the real master of the taiga.

The information concerning the "bear cult" and describing the ritual of "head disposal" provided by E.S. Novik (1984: 206 – 215) seems to reflect the primary opposition of the two "masters of the Middle World" and to testify to the constant reproduction of the mythic act of the "primary division of the world between humans and wild animals." It is noteworthy that the Evenkian "bear feast," together with the relevant set of mythological ideas, have been preserved and recorded by researchers in a reduced form. This phenomenon represents an ethnic specific variant of similar beliefs and rituals having existed in the past and still existing in the cultures of all indigenous peoples of Eurasia and North America (Alekseenko, 1960; Kreinovich, 1973; Sokolova, 1971; Tsintsius, 1971; Sternberg, 1936).

Descriptions of the Evenkian "bear feast" by various researchers demonstrate a common pattern of a stereotyped ritual behavior resembling hunting rituals in certain features In particular, the pattern of "seeing off a guest animal," just as the "ritual for a bear killed in its den" includes ... certain ceremonies connected with its tracking, killing, butchering, and distributing of its meat...simulation of guest welcoming, during which the bear's head or its image is "treated," "entertained," provided with gifts for its family, and ceremonially "seen off." This last ceremony includes the rites of placing the bear's skull and bones or their models on a tree or dais, or in a sacred family storehouse... Unlike the rituals celebrating the end of certain hunting period, the "bear feast" has never had any particular traditional calendar terms and was performed each time a bear was killed in its den (Novik, 1984: 213).

Other set of evidence on the "bear feast" was collected during questioning on the etymology of certain hydronyms from the territory of dispersal of the so-called Katangsky group of Evenks (the Nizhnaya Tunguska basin, the Erbogachensky, Nakannovsky, and Nepsky variants of the Northern dialect). A hydronym *Chukil* has been noted designating two small brooks within the territory of two neighboring community grounds. Families of these two communities occupied this region relatively late, not earlier than the second half of the 19th century. The communities unite representatives of two territorially separate and formerly competing "dialect-tribal" groups: the Eromo-teteisky and Nakannovsky.

Interviewees from these two communities told that the hydronym *Chukil* was directly connected with the last act in the three-day cycle of rituals of the "bear feast," in particular with the ritual wrestling between a boy and a "stuffed" bear and the succeeding "head disposal" of a killed animal. Such a common etymology of the hydromyn seems reasonable, because both the "stuffed" bear and the platform used for the "head disposal" (a tree or a high dais) are designated with the same word, *chuki*. It may be inferred that the origin of such a hydronym is linked with the fact that killing a bear in its den and especially the corresponding ritual of "seeing off – disposal" of the animal were extraordinary ceremonies memorized by several generations of the inhabitants of the territory in question (Vasilevich, 1971· 160).

In full accord with S.M. Shirokogorov's remarks on a constant opposition between humans and animal for territory, we may hypothesize that a bear den and the animal in it were perceived as a "house of a foreigner" and an "invasion" of a "foreigner" into family hunting grounds. In this context, killing an animal in its den and the consequent ritual of a "*chuki* disposal" may symbolize the norms and order in the organization of "living space" that have been established by the "acts of cosmos creation." E.S. Novik provided additional support to the proposed explanation of the final rituals of the "bear feast." She wrote that the rituals of this cycle, in the same way as shaman's initiations, may have served as a language of cosmic relationships during the calendar feasts when communications with all (or major) gods responsible for human prosperity are being established (Novik, 1984: 213 – 214) (see also (Vasilevich, 1971: 162)).

Novik believes that the composition of ritual ceremonies of the "bear feast" coincides with "seasonal rituals connected with revival of souls of killed animals. " The same method of classification of tribes with respect to their totems is used in the "bear feast" as a universal language connecting human communities with the environment. The bear image represents a universal mediator providing a key for comprehension of these connections (Novik, 1984: 215). For instance, the Nganasan ritual of a "clean *choum,*" just as the Evenkian feast of *ikenipke* in the Podkamennaya Tunguska basin, includes a simulation of cosmic moose hunting, a ritual generally non-typical for shaman mysteries. The major character of this pantomime represents a collective image corresponding to such notions as a "giant," "fabulous hero," "devil," "ogre," and "ghost-predecessor" and is designated by the name *Mangi*, same as bear The term for the Milky Way is a derivative of the word *mangi*: *Mangi tulnedzek, Mangi yankan, Mangi kingnedzenen, Mangi udzian,* literally 'Mangi's ski track' (Sravnitelny slovar..., 1975: 530). The word *Mapa* in the Orochi, Ulchi, Oroki, and Nanai languages, like *Mafa* in the Udege and Manchurian languages, seems to belong to the same lexical unit designating mythological images of "Heavenly hunters" (Ibid.: 531).

The idea of "replication of the Universal order" seems to be reflected in the pantomime of "a boy wrestling with a *chuki.*" Wrestling is an obligatory element in the final stage of the "bear feast" and an integral part of the ritual of the "head disposal." This performance is aimed at informing *Seveki* that all the members of the community fulfill the norms regulating relationships between the realm of the "supreme ghosts" and people. At the same time, this ritual symbolizes a regularly repeated (after a mythical victory occurred at those times when the earth was being born) victory of a "human, as a younger brother" over the "elder one" (in this case over a real bear) and represents a repetition of a primary act of "heavenly organization of living space." A boy appointed for "wrestling" ("a younger brother"?) firmly holds *chuki* (a bear's head entwined in twigs) and simulates a cruel fight The people attending the ritual watch this fight and invigorate the boy with approving remarks. Finally, the boy raises *chuki* over his head, throws it on the earth and weighs it down with his knee. In the 1920s, G. M. Vasilevich recorded the ritual of the Podkamennaya Tunguska Evenks and stated that until the 20th century *chuki* as an image of a bear represented parts of the bear's body, including its head and "skeletal bones in anatomical order," entwined in twigs (Vasilevich, 1971: 163).

The bear's head was placed on a special platform (in a tree hollow or embranchment) either immediately after the end of the wrestling pantomime and ritual feeding with *tekemivun* ~ *tekevun* (a festive food made of chopped boiled bear meat, heart, lungs, and liver cooked in bear fat (Sravnitelny slovar..., 1977: 230)), or on the following day, depending on various Evenkian ethnic groups. The rest of the ceremonial food *tekemivun* ~ *tekevun* had to be distributed among other relatives and members of the community who did not attend the ceremony itself so that they might feel involved in the ceremony through this ritual feeding (Vasilevich, 1971: 163).

A local specific feature of the ritual of "bear disposal" has been noted in the ethnic group of the Evenks populating the Podkamennaya Tunguska basin. They performed a ritual of "disposal" of the bear's eyes, which were placed on a separate larch also called *chuki.* A day before the ritual of the "head disposal," participants of the "bear feast" went to the taiga in search of an appropriate tree. The Evenks hewed three sides of the tree out and made a notch at a height of 2 m, in which the bear's eyes were placed wrapped in bark or twisted around with twigs. They pronounced the ritual words: "Grandfather, we hide your eyes in the *chuki*...birds are screaming!" The following day, upon the end of the wrestling pantomime and ritual treatment, the hunter who had found the bear's den went to dispose of the bear's head in the *kongi* – usually in a cedar's hollow

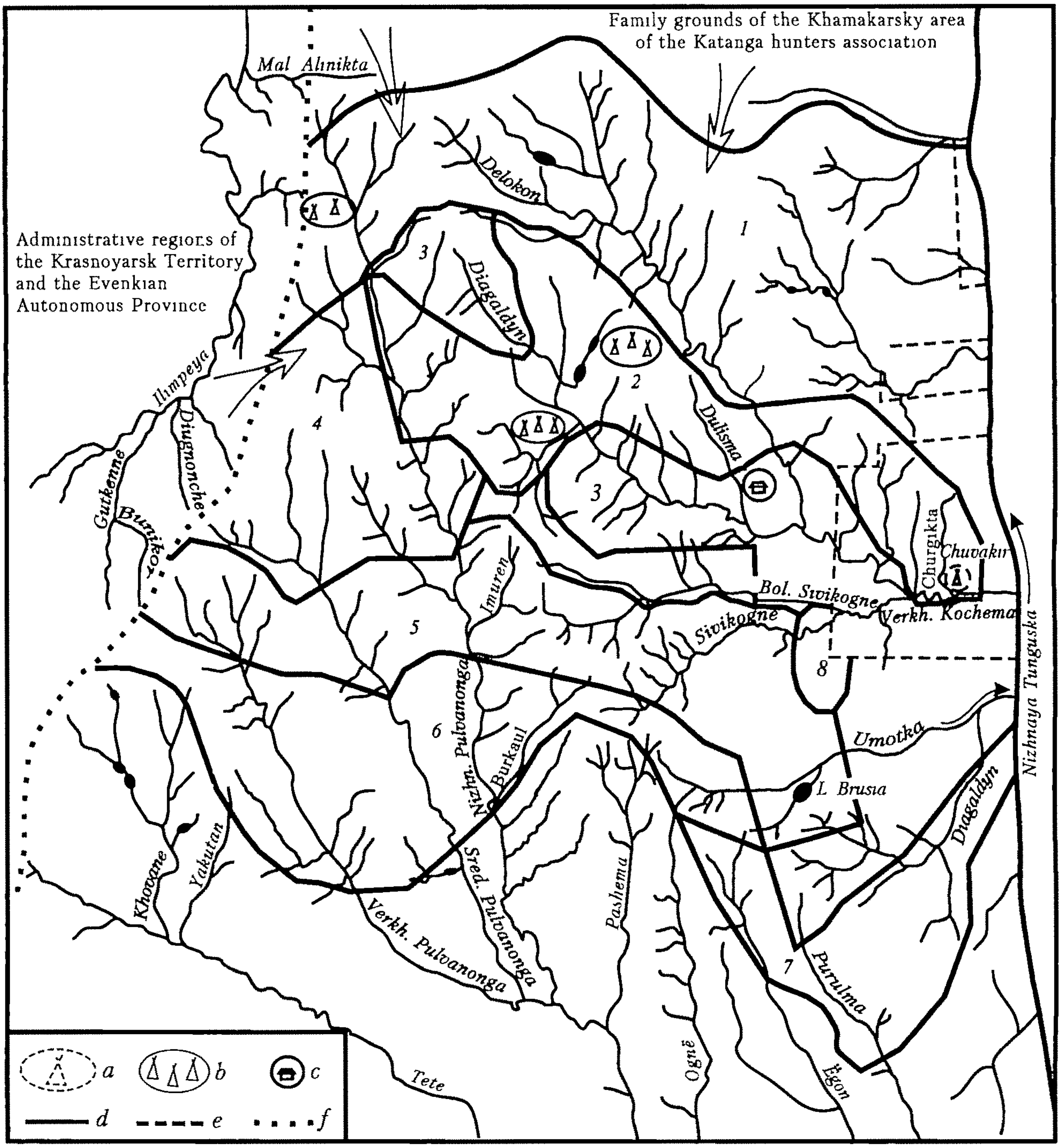

Fig. 1. Map showing grounds of nomadic Evenkian families of the Katanga area.
Family grounds belonging to *1* – M. and G Golins, *2* – L.P Sychegir, *3* – V.P Sychegir, *4* – A.Y Veretnov; *5* – E.Y. Veretnov; *6* – N V Kaplin, *7* – P.K Kaplin, *8* – V D. Kaplin
a – an abandoned camp of L P Sychegir, *b* – seasonal camps of the Sychegirs, *c* – winter camp of the Suchegirs; *d* – borders of family hunting grounds, *e* – borders of Russian hunting grounds; *f* – administrative border of the Evenkian Autonomous Region

(Sravnitelny slovar…, 1975: 411). From that moment the cedar was called *chiki*. The hunter had to pronounce the words: "Grandfather, I have found the *choum* for your head, which no one could ever detect." Judging from the pictures provided in the book by Vasilevich (1971: 163), the bear's skin and bones wrapped in twigs were placed on a special dais *delken* in the immediate vicinity of the *chuki*.

In some cases (in the ethnic group of the Symski Evenks usually), the skin removed from the bear's head was given to a shaman who used it in his rituals of "seeking for an ill person's soul" (assuming a "trip to the Lower Realm, a land of bears"). Apparently, it is because the skin symbolizes the soul of an animal whose mission is to accompany the shaman in his "travelling."

It is interesting that in the Symsky Evenkian group, the *chuki* included also the bear's jaws and certain bones together with gifts, such as colored ribbons, a comb used in the ritual combing bear's fur, earrings made of cedar needles, and a bow and arrows that had been used during the festival (probably during its first phase) imitating the shooting of the killed animal. All of these were wrapped in birch bark, twisted around with twigs, and carried away to the west from the camp. This bundle was hung from the trunk of a cedar that was selected in advance, while the animal's head was placed on a stump (of an average human height) of a young cedar and fixed between two pins left on the upper surface of the stump.

Thus, a brief summary of the paper includes the following inferences.

1. The meaning of a discovery of a bear in its den, its killing and the following rituals implies the purpose of suppressing the attempts of an "alien" creature to invade the hunting grounds belonging to the community, which was perceived as a violation of the established "world order."

2. The stereotypical, traditional forms of ritual behavior throughout the "bear feast," and especially during its final phase, the "head disposal," demonstrate a re-establishment of relationships between the two opposing communities: "real humans," including members of two or more family clans, and bears-"werewolves" representing an alien "neighboring community." These relationships were broken through the bear's invasion during a "mythological untimeliness" and re-established both indirectly, through traditionally prescribed verbal "signs," and directly, through a prescribed composition of participants.

3. If the first two points are correct, then *chuki* and the related hydronym Chukil may be considered as the "markers" of the territories included in the habitat of an Evenkian community, its "living space," which is perceived by the Evenks as the crossroads of the diachronic and synchronic links with the macrocosmos.

The latter hypothesis may be supported by the following observation. Construction of the *chuki* is not the only method of "marking space" and distinguishing the territory between "our" and "alien" grounds. The toponymy and hydronymy of the Evenkian territories includes names linked with certain economic activities (e.g., "salmon trout river," "middle river") and also with certain "memorable events" (e.g., "a place where deer have drowned," "Maria's brook," "old camp," etc.). Through these names, the territory is regarded as "home, my (!) place." Maps and polls of the Evenks populating the Tura village (a local administrative center of the Evenkian Autonomous Province) provided two more names of rivers that are probably connected with Evenkian religious rituals, just as the Chukil.

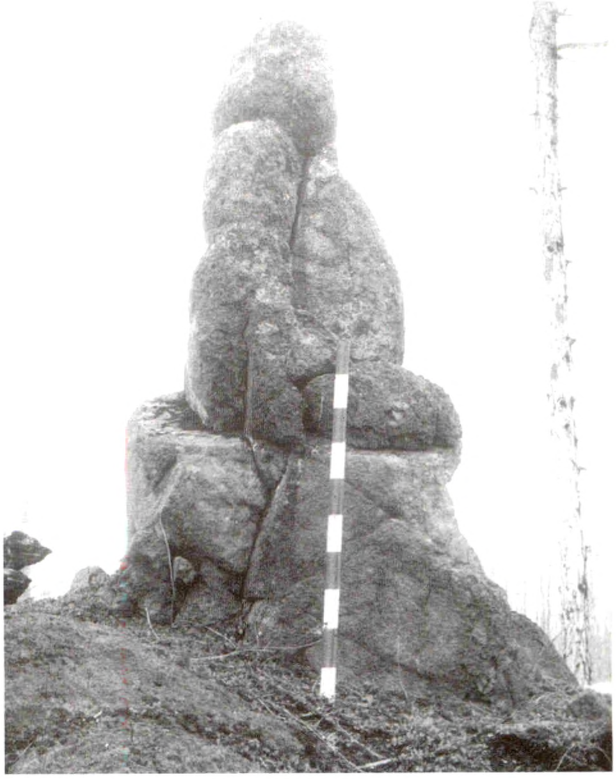

Fig. 2. Weathered rock reminiscent of an anthropomorphic stela in the Ikhedekit locality.

V.P. Boyarshin, an ethnic Evenk and a resident of the Erbogachën village, made up a map of the hunting grounds belonging to the Evenks of the Katangsky region (Fig. 1). There is a river named *Bunikor* situated to the west from the major living area of the Katangsky Evenks. This river forms a natural border separating traditional living areas that have been populated by the Erbogachën and Ilimpeya dialect groups of the Evenks since the 16th – 17th centuries in the Nizhnaya Tunguska basin. This hydronym is well correlated with the Evenkian word *buni*, whose derivatives have connotations of "death," "grave," and "realm of the dead." The living area of the Ilimpeya dialect group contains the small river *Ikhedekit*, which means "a ground for singing and dancing; a place where people dance and sing" in the Evenkian language (probably, from *ike-* 'to sing', *ikendzek* with the suffix ending –*kit*). It is noteworthy that the set of derivatives from *ike-* contains also *ikevlenni* meaning "to perform a hunting ritual over a killed bear" (Sravnitelny slovar..., 1977: 361). The local Evenkian hunter said that there was a large stone (about 2 m high) on the high left bank of the river. This stone looked like a stone anthropomorphic stela from a distance ("he feared to approach this figurine") (Fig. 2). Even if this anthropomorphic figurine is a result of natural weathering of a solitary rock remnant, it may be used (judging from the name of the river) as a sacred place where religious rituals were regularly performed.

In sum, it is necessary to stress the fact that all inferences provided in this paper as well as any other attempts to understand religious phenomena should be considered as preliminary interpretations of the features of spiritual culture of the Evenks. However, additional data on the "unusual" hydronyms and the relevant landscape elements represent new information on the topic that may be titled as "traditional Evenkian forms and methods of marking living areas."

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Table 4. Concentrations of zinc, copper, and strontium in human bone samples taken from various individuals buried in Minino I (ppm)

N	Age*	Sex	Zn	Cu	Sr
3	30 – 39	Male	86 48	3 16	46 12
4	25 – 35	»	71 76	1 38	88.32
5	20 – 29	»	86 61	3 38	40 14
10	20 – 29	»	105 31	8 70	113 14
11	50	»	81 46	2 02	53 12
13	30 – 39	»	72 94	2 67	56 65
15	25 – 35	»	142 83	2 91	50 80
16	35 – 45	»	113 46	3 69	71 73
17	35 – 45	»	107 04	8 42	59 96
19/2	20 – 25	Female	125 85	5 72	77 94
19/3	18	Male	126 94	4 85	51 14

* Sex and age determinations were made by Buzhilova

analysis of human bone samples from the Mesolithic burials in Europe and America (the European materials include those from Oronsay, Scotland; Téviec, Brittany; and some coastal sites in Portugal and Denmark). The total number of samples is 15. The average $\delta^{13}C$ value of –14.5‰ attests to a specialized marine diet with the predominance of fish rather than sea mammals. Richards and Hedges stress that the prehistoric inhabitants of Newfoundland ($\delta^{13}C$ –20.3), British Columbia ($\delta^{13}C$ –18.6), and the Californian coast ($\delta^{13}C$ –20.3), in contrast to Europeans, focused on sea mammal hunting rather than on fishing or mollusk gathering. This is important, given that America was populated by specialized hunters who, thanks to their mobile lifestyle, covered huge distances and dispersed over vast territories with considerable rapidity.

Large fresh-water reservoirs provided an environment that was closer to the coastal habitats than to inland ones. The study of diachronic variation in dietary types of Neolithic and Bronze Age populations of Lake Baikal coast and the Lena and Angara valleys provides an illustration of this (Katzenberg, Weber, 1999; Weber, Link, 2001). The isotopic analysis of human bone samples from Neolithic (5800 – 4900 and 4200 – 3000 years BC) and bronze-age burials (3400 – 1700 years BC) provided a basis for respective reconstructions.

As expected, the most variable characteristics were those concerning Neolithic populations: the $\delta^{13}C$ value in human bones from the Cis-Baikal area (Lokomotiv) is –15.8‰, suggesting that diet consisted of lacustrine fish possibly belonging to the shallow-water species. The respective value for samples from Makrushin and Turuk, the Lena valley, is –20 2‰, which is typical of populations consuming mostly the meat of herbivorous land animals (Katzenberg, Weber, 1999; Weber, Link, 2001). A large lake such as Baikal produces an appreciable effect on diet because its food resources are much more diverse than are riverine ones. Inhabitants of river valleys prefer to exploit the rich resources of the taiga.

A somewhat different pattern emerges when one reconstructs the dietary types of populations inhabiting the coasts of lakes in northwestern Russia. Doubtless, Mesolithic and Neolithic cultures flourished in these territories thanks to a favorable environment, specifically to rich food resources.

In 1993 the expedition from the Vologda research center "Antiquities of the North" headed by Vasilyev, discovered a stratified burial ground Minino I on the coast of Lake Kubenskoe (Suvorov, 1998). Archaeological finds suggested that the most ancient burials date back to the late Mesolithic, and the conclusion was supported by radiometric dates (early 6th – early 5th millennium BC). Results of spectral analysis of bone samples taken from several skeletons dated to the Mesolithic and to the Early Iron Age demonstrate considerable individual variation of diet, like in Scandinavian Mesolithic burials. However, in neither skeleton from Minino I was the concentration of zinc high enough to conclude that people specialized in fish diet (Table 4). Rather, the diet was likely of a mixed type and included meat of land mammals, mollusks or insects, and plants. Regrettably, only one female skeleton was analyzed, making it impossible to evaluate gender differences in diet. Female bones were found in a double burial, and concentrations of the three elements in them resembled that in male bones from the same grave.

Age variation was insufficient for the evaluation of types of diet peculiar to children and elderly persons. Considerable individual variation suggests that differences between dietary profiles of various individuals were both structural and quantitative. People buried in graves 4, 11, and 13 apparently experienced periods of prolonged malnutrition or even starvation.

The most variable components of diet in Minino I were vegetables and meat. This is paralleled by materials from the late Mesolithic burial ground at Oleniy Ostrov. Jacobs (1995) attempted to separate its burials on the basis of the amount and quality of burial goods, using this as a criterion of social status He evaluated the correlations between this criterion, on the one hand, and robusticity, health status, and diet, on the other. Diet was assessed using the content of strontium. Unfortunately, this element is indicative only of the vegetable component, mostly cereals.

Jacobs's results suggest that an inverse relationship existed between strontium level and the "richness" of burial. Strontium concentrations were mostly higher in females, probably attesting to the larger proportion of vegetable food in their diet. The "richest" graves contained skeletons with the lowest amount of strontium, so these people must have consumed less vegetable food. This, indeed, should be expected. High-ranking people enjoy a more nutritive diet. Robusticity indexes, in contrast, do not show any association with "richness" of burial. Perhaps dietary variation was not really strong, after all.

Foraging populations inhabiting the lacustrine areas of northwestern Russia did not focus on water resources, as did the shallow-water coast dwellers of the Pacific, Atlantic, and Baikal. Rather, their diet was comparable to that of the people of Mesolithic Kunda and of the inland areas of Sweden. This may be due to some cultural affinities, but also to ecological factors. The second explanation is more likely. As the study of numerous Mesolithic and Neolithic populations of Scandinavia has demonstrated, dietary types are influenced by local food resources rather than by cultural tradition (Liden, 1995). This regularity holds until the transition to production economy.

Mesolithic and Neolithic populations of the East European forest zone

Boreal forests of Eastern Europe may be regarded as a separate ecological niche. Moderate to low temperatures, high humidity, dense forest restricting mobility, rivers serving as principal communication routes – all these features unite vast territories and make it possible to view Mesolithic and Neolithic populations inhabiting them as a single structure. Available materials enabled me to reconstruct the diet and health status of these populations using samples from several burial grounds situated in this zone.

On the diet of people who lived at Ivanovskoye VII

Ivanovskoye VII is a stratified site situated near the village of Ivanovskoe, 30 km northwest of Pereslavl'-Zalessky. It was discovered by Krainov in 1973 and excavated by the Upper Volga expedition from the Russian Academy of Sciences Institute of Archaeology over several field seasons (Utkin, 1998). Human remains coming from the waterless valley where the Neolithic part of the site is situated (Zhilin, Engovatova, 1998), are highly relevant for reconstructing the appearance of the late Volosovo people of the final Neolithic. The analysis of crania from various Volosovo burial grounds suggests that these populations were genetically related to the earliest Mesolithic inhabitants of the forest zone represented by burial grounds such as Southern Oleniy Ostrov, Popovo, and Zveinieki (Alekseeva, 1997). Five variously preserved burials were discovered at the site (Kostyleva, Utkin, 1998).

Physical anthropologists are often faced with the necessity to examine unique materials which are scanty and poorly preserved. No population reconstruction can be made on this basis. The only option in such cases is to focus on single individuals. While the information potential of this method is disputable, no alternative approaches to small skeletal samples exist at present (Kozlovskaya, 1998).

A spectral analysis of five samples of bone was carried out. Concentrations of copper, zinc, and strontium were evaluated (Table 5). All these elements have been traditionally used for the reconstruction of dietary types. Although the individual variation of zinc and strontium in this small sample is very high, all individuals except N 5 evidently consumed much meat of land vertebrates or fish and little vegetable food.

Notably, the chemical composition of bone tissue of skeletons from burials 2 and 5 differs from that of bone remains found in the cultural layer of the site. Samples from the burials have yielded results that might be predicted. High concentrations of zinc are caused by eating meat of land mammals and fish. In this case, it is likely that the diet was mixed and fish was not as predominant as it was in the diet of people buried at Sakhtysh IIa (Kozlovskaya, 1996, 1997). The conclusion that people buried at the site in graves of the Lyalovo period (4th millennium BC) practiced a mixed-type hunting-fishing-gathering

Table 5. Results of spectral analysis of human and animal bone samples from Ivanovskoe VII (ppm)

N	Object	Sex	Age	Cu	Zn	Sr
1	Human cranium from cultural layer	Male	30 – 40	2 44	164 27	69 09
2	Animal bone	–	–	1 71	210 01	116 59
3	Human, burial 5	Female	Ca 20	6 05	237 99	63 59
4	Human, sq IIa	»	?	3 81	55 65	74.11
5	Human, burial 2	Male	?	6 17	306.54	55 55

economy is supported by the analysis of faunal remains (Kirillova, 1998; Karhu, 1998; Sychevskaya, 1998).

The results are the closest to those concerning two skeletons from the Neolithic site of Zamostye, which has been excavated by Sorokin for many years*. The concentration of zinc in the male skeleton from gravel 4 is 180 ppm, and that in the female skeleton from grave 3, 357 ppm. Strontium levels are 35 and 43 ppm, respectively, and those of copper, 9 and 18 ppm. Perhaps the Zamostye male consumed more meat of land animals, whereas the female ate more fish. The comparison of two skeletons (male and female) from Ivanovskoe VII does not reveal differences of such magnitude. In skeletons from the cultural layer, concentrations of copper and zinc (indicators of animal food) are much lower, and those of strontium (indicative of vegetable food) are higher In sample N 4, the content of zinc is extremely low. How might that be explained? So far, I can suggest only three hypotheses:

(1) for some reason, the cultural layer contained remains of individuals whose diet differed from that of people who inhabited the site;

(2) skeletal fragments from the cultural layer were subjected to some treatment which affected the chemical composition of the bone tissue; and

(3) chemical differences between bone samples from the cultural layer and from the burials are due to the poorer preservation of the former.

Sakhtysh IIa: Health, lifestyle, and nutrition

Comprehensive ecological studies of human remains from the Sakhtysh IIa burial ground make it possible to correlate the variation of dietary indicators with demographic parameters, robusticity indexes, and health status. The skeletal sample from this burial ground may provide a model for reconstructing biological features of an Eneolithic population of hunter-gatherers living in the forest zone with moderate climate. The site was discovered by Krainov, Kostyleva, and Utkin in 1986. In 1993, the excavations were completed (Alekseeva et al., 1997)

The present study addresses the occurrence of stress markers in skeletons from Sakhtysh IIa and the reasons which might have caused the stress.

According to the stress concept as applied to skeletal materials (Goodman et al., 1984), its indicators fall into two groups: those of cumulative stress and those of occasional stress.

Markers of cumulative stress *(demographic indexes).* Paleodemographic data concerning the Lyalovo population have been analyzed in a recent collective monograph (Fedosova et al., 1997). The authors focus on the considerable number of children's skeletons and low average age at death (26 years for adults). The integration of various sex and age estimates reveals the following demographic pattern.

At present, the available skeletal sample from Lyalovo represents 15 individuals, six of whom (40%) are children, five (33%) are males, and four (27%) are females. These proportions are closer to those that might be expected in a real population than in some artificial sample. In the adult subsample, the proportion of males is 55%, and that of females 45%. Generally, in the prehistoric series, males are more numerous than are females.

The available materials from Lyalovo, then, suggest that the demographic proportions do not deviate from the expected ones in terms of sex ratio, low age at death, and possibly higher life expectancy in males. Is there anything unusual? Perhaps a large number of children and a small difference between the life expectancy in males and females should be noted. Normally, high fertility is associated with pregnancy and postpartum stresses and accordingly high mortality among females in the childbearing age. As noted by Fedosova et al. (1997), the preservation of skeletal remains is rather poor, so sex and age estimates should be viewed with caution. The conclusion concerning high fertility in the Lyalovo populations appears to be better founded.

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* I am grateful to A.N Sorokin, who has kindly supplied samples for chemical analysis.

Demographic reconstructions for the Volosovo population is much more reliable thanks to the larger sample size and its better preservation (Ibid.). The authors note an appreciable increase in average age at death which, in the pooled Volosovo sample, is estimated at 32.9 years. Some differences between males and females have been noted for both stages of Volosovo Culture (early stage: males, 34.3 years, females 32 years, late stage: 37 and 35 years, respectively). By the standards of prehistoric foraging populations, these estimates are quite high. Burials of Volosovo children are of special interest. They are very few (11.5% of the total number of burials). The authors believe that this may be explained by a custom of burying children in separate places.

The increase in female life expectancy is most often caused by a lesser parturition and postpartum stress. Possibly, the low number of children's burials is due not only to specific funerary customs but to changes in the demographic structure.

All these problems notwithstanding, it may be concluded that living conditions of late Volosovo people were better than were those of Lyalovo people.

Markers of occasional stress. *1. Enamel hypoplasia.* The frequency of this marker in the Sakhtysh sample is high (79.31%), which is considerably higher than in medieval hunter-gatherers of the New World (45%) or in prehistoric hunter-gatherers of California (16%) (Goodman et al., 1984). Certain populations of Stone Age foragers, though, display high frequencies of this trait (86 – 94%) (Cassidy, 1984: 307).

Enamel hypoplasia attests to high stress experienced in childhood. Notably, the occurrence varies with time: Lyalovo, 100%; early Volosovo, 85%; and developed Volosovo, 66%. Despite the fragmentary nature of data, then, it is evident that the stress level gradually diminished.

The observed pattern becomes even easier to interpret if sex is taken into account. Females from Lyalovo display only multiple hypoplasia. In the early Volosovo sample, all female skeletons show some degree of this trait, whereas only one of the two males had enamel hypoplasia.

Among the people buried in the cultural layer, the pattern is as follows: all females exhibit some enamel defects, but only 50% of males do. No differences between the age cohorts in adults have been registered with regard to this feature.

These results are relevant for the intensity of stress experienced by these populations, and some conclusions can be made. They should be regarded as tentative, though, given the poor preservation of the skeletons:

(1) stress level was quite high;
(2) it gradually decreased with time; and
(3) the decrease of stress mostly concerns the males.

Given the above, it may be hypothesized that the quality of life was becoming progressively higher in Neolithic and Eneolithic populations. There are no reasons to establish a direct relationship between this achievement and environmental changes such as those in temperature, vegetation, or humidity. The data are too fragmentary, and the pattern of climatic variation during the Neolithic and Eneolithic is quite variable. The direction of trend in stress level makes it more likely that the key role was played by social factors. As mentioned above, the decrease of enamel hypoplasia concerned mainly the male part of the population. It is not clear as yet whether these sex differences are due to a more rapid adaptation of males or to some gender-related social factors. The fact that all skeletons from Lyalovo burials were affected suggests that early stress was quite high (Kozlovskaya, 1997). Late Neolithic people from Ertebölle, southern Sweden, in contrast, display a very low occurrence of enamel hypoplasia – 7% (Liden, 1995). What factors, then, might account for the vulnerability of children in the Sakhtysh population? The question cannot be answered at present. The most likely reasons are malnutrition, starvation, and intestinal diseases. Only in the late Volosovo group does the frequency of this stress indicator decrease, and the tendency concerns mostly boys, who display a 50% occurrence. It is noteworthy that the reduction of stress is seen mainly in males. This may be explained either by higher living standards enjoyed by boys or by a more severe selection among the boys, resulting in the survival of the most healthy individuals only.

2. Vascular reactive changes in cranial bones. Cold stress is a factor that affects various macro- and micromorphological skeletal features. Cold, humidity, and wind affect the peripheral vascular system of the uncovered parts of the human body. Vasodilation and peripheral blood flow intensity may cause changes in nutrient foramina in certain areas of bones (Fig. 1). As a result of adaptation to cold, specific pores emerge on the surface of cranial bones (Buzhilova, 1998). A high frequency of porous bone surfaces may attest to a prolonged exposure to cold air.

Vascular reactive changes are frequent in Lyalovo people, both females (67%) and males (100%). Various degrees of the symptom are exhibited by all crania from Volosovo burials. This indicates that people experienced prolonged exposure to cold, and their vascular system had adapted to these conditions.

3. Orbital osteoporosis. Specific changes on the upper orbital wall, known as orbital osteoporosis, or

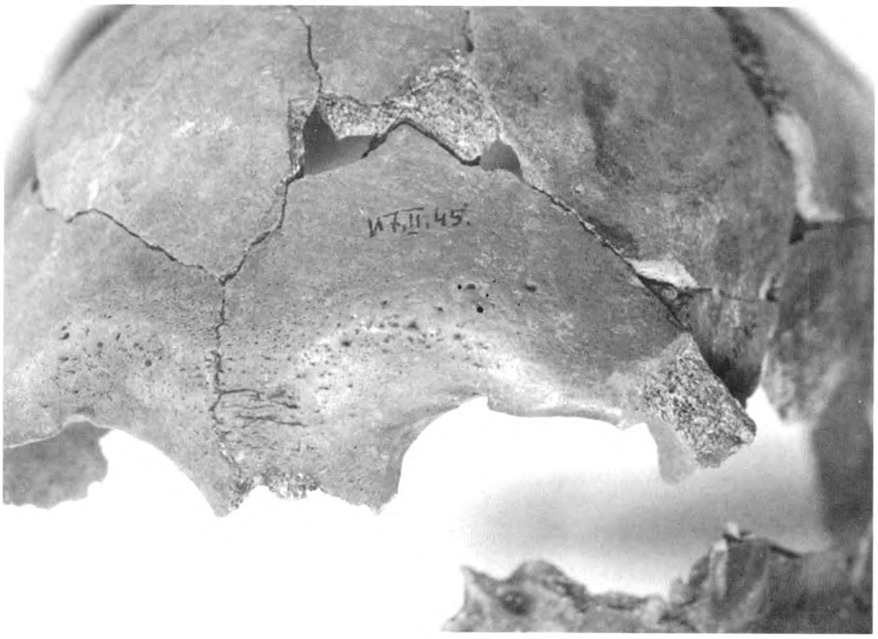

Fig. 1. Enlarged nutrient foramina in the supraorbital region. Male cranium from the cultural layer of Ivanovskoe VII.

cribra orbitalia, are widely used as symptoms of stress. The etiology of this condition is a matter of debate. The analysis of its frequencies (Buzhilova, 1999) strongly suggests that the key factor was the intensity of infectious diseases. Orbital osteoporosis was not found on any of the Lyalovo crania, but was registered on 18% of Volosovo skulls (four out of twenty-two, including a male and three females). In all instances, the expression of the trait is quite weak (grade 1). However, its appearance in late Volosovo people may be a result of some pathogenic factors.

4. Periostitis. Symptoms of periostitis include reactions of the bone tissue to a wide range of pathogenic factors (Ortner, Putchar, 1981). Generally, the formation of porous layers on the surface of bones is related to chronic inflammatory processes in the periosteum. These processes may be caused by inflammations of traumatic origin, syndromes that include anaemia, and infections (Ibid.).

Periostitis and related symptoms on tibiae occur in Lyalovo and Volosovo skeletal samples (Table 6). In the former group, this marker is present in two males. Among the individuals buried in early Volosovo layers, all females and 90% of males were affected, and the respective frequencies in the late Volosovo sample are 61% *versus* 37%. Factors responsible for periostitis, then, were to some degree active in both Lyalovo and Volosovo communities.

Which pathogenic factors were the most likely in these specific cases, then? Because the expression of the symptoms is weak, we tend to regard them as physiological reactions intermediate between normal and pathological. In all instances, only tibiae are affected (Fig. 2), and the reasons appear evident. Veins of the shank belong to the most vulnerable parts of human circulatory system. It is here that congestions and oedemas are the most likely to develop, and these veins are the first to lose elasticity as a result of an immobile way of life.

The difference between Lyalovo and Volosovo skeletons deserves attention. In the former series, periostitic symptoms are far less common. Their frequency is the highest in early Volosovo remains. Because all series are small, these conclusions cannot be statistically supported. It should be noted, however, that among the Lyalovo and late Volosovo skeletons, the occurrence is the highest in males while being much lower in females; and not a single case was observed in infantile or juvenile individuals. These proportions disagree with the normal distribution pattern of an infectious disease. It is more likely, then, that periostitis was caused by stresses related to certain adult occupations, mostly those of males.

The study of coprolites from the Volosovo cultural layer at Voymezhnoe I (Khrustalev, 1997) revealed a high rate of infestation with the tapeworm Diphyllobotrium latum. Diphyllotribiosis is a condition that inhibits the activity of the small intestine. Because this part of the intestine is responsible for the absorption of most proteins, lipids, and carbohydrates, its malfunction may cause anaemia.

Table 6. Frequencies of periostitis in human skeletons from Sakhtysh IIa

Culture	n	Percentage
Lyalovo	9	22
Early Volosovo	11	84
Late Volosovo	38	39

The most favorable biotopes for this tapeworm are shallow well-heated reservoirs with stagnant water. Ultimate hosts of the sexually mature helminth are humans, wolves, dogs, and bears. The intermediate hosts are fresh-water crustaceans, and additional hosts are certain species of fresh-water fishes. Based on these facts, it may be concluded with a fair degree of certainty that people engaged in fishing and hunting were infested with fresh-water helminths.

Can chronic helminthosis cause periostitic symptoms in the shank? We have found no direct evidence of such relationship in the available literature. However, it appears that the hypothesis is not altogether unfounded.

Another suggestion is to associate periostitis with reduced mobility. As noted by Fedosova (1997), the weak muscular relief of the leg bones in Sakhtysh people was caused by a small amount of physical stress to which these people's legs were subjected. In her opinion, this should be expected if people spend much time in a sitting posture, possibly in the boats.

Perhaps dense mixed forests were difficult to cross on foot, so the principal communication routes were rivers and lakes which might be crossed on boats or rafts. Prolonged and immobile stay in a cold and moist environment might have caused the excessive cooling of the legs and the development of congestions in peripheral blood and lymphatic vessels, which, in turn, resulted in periosteal symptoms.

Importantly, the highest frequency of periostitis was found in early Volosovo skeletons, both male and female. Evidently, the stress accounting for these symptoms was the heaviest during this period.

5. *Degenerative-distrophic changes in the joints.* Age changes in the adult human skeleton are considerable. Various pathological conditions developing in the elderly are related to the aging processes in the bones. Degenerative changes in joints of younger individuals, in contrast, attest to heavy stress due to mechanical, infectious, or metabolic factors (the resulting changes depend on the specific factor). Frequencies of this feature in various groups are presented in Table 7.

In Lyalovo, arthritic exostoses in the peripheral parts of the joints were observed in two male skeletons (those from graves 40 and 42) out of three. In one case (burial 40), articular (sternal) surfaces of clavicles are affected, in another, the same plus the opposite (humeral) surfaces of clavicles, and the proximal epiphyses of ulnae. The nature of the changes and the age of the individuals make it likely that the underlying factor was mechanical stress. No distrophic symptoms were registered in joints of females.

In the early Volosovo sample, the condition was found in 90% of male skeletons. No relationship between age and joint degeneration was detected, again implying that mechanical stress was considerable. Only two female skeletons from early Volosovo burials are available, and only one of them (burial 10, 30 – 40 years of age) exhibits degenerative changes in the elbow joints.

The late Volosovo sample is the largest. Six male skeletons out of 13 (46%), and eight female skeletons out of 19 (42%) display arthritic symptoms.

The above facts suggest that the intensity of stress affecting the shoulder girdle and arms was much higher in early Volosovo people than in late Volosovo ones. It is difficult to assess the difference between the Volosovo and Lyalovo people as the latter are represented by a very small sample.

6. *Degenerative changes in the spine.* Pathological symptoms in the spinal region are less frequent than are those described above (Table 7). It is virtually impossible to draw any conclusions on the basis of the Lyalovo series, where vertebrae of only four individuals are sufficiently preserved. In one of them (burial 42) spondylolisis of thoracic vertebrae was observed.

In the early Volosovo sample, one skeleton out of six on which the condition might be scored exhibited distrophic changes (burial 10), and in Volosovo series, the largest one, seven individuals out of nineteen reveal similar symptoms.

Because two out of three samples are small, no reliable comparisons can be made. The high frequency of the condition in the late Volosovo series is doubtless due to the increased duration of life

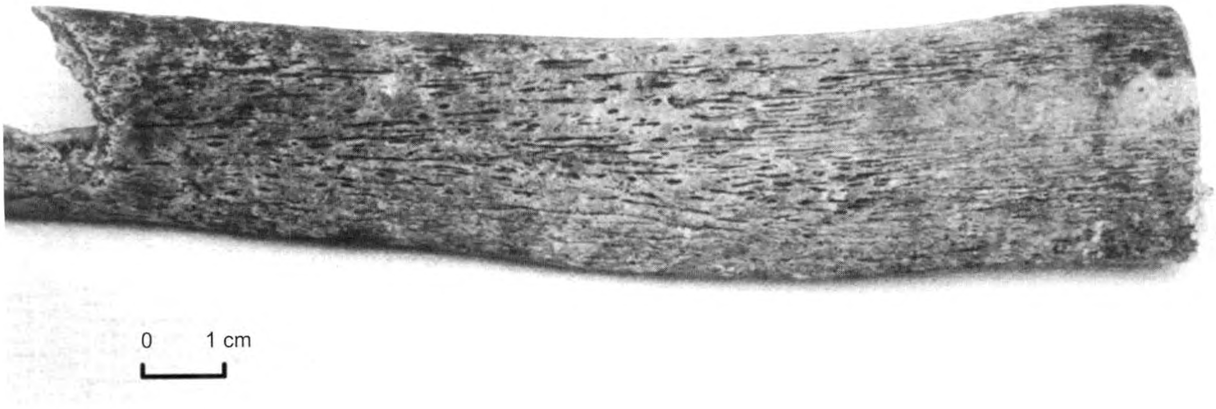

Fig. 2. Symptoms of periostitis in a fragment of a right tibia of a female aged 30 – 39 from the late Volosovo burial at Sakhtysh IIà.

Table 7. Frequencies of degenerative-distrophic changes and symptoms of intervertebral cartilaginous herniae (Schmorl nodes) in human skeletons from Sakhtysh IIa, %

Culture	Degenerative-distrophic changes		Schmorl nodes
	Epiphyses of long bones	Vertebrae	
Lyalovo	22 (9)*	25 (4)	50 (4)
Early Volosovo	75 (13)	17 (6)	50 (6)
Late Volosovo	44 (32)	37 (19)	15 (20)

* Total number of skeletons is given in brackets.

since all distrophic changes were registered in individuals elder than 30.

7. *Schmorl nodes.* The occurrence of symptoms resulting from cartilaginous herniae and located on the intervertebral articular surfaces is presented in Table 7. Because the Schmorl node forms when the vertebrae are compressed, this condition may be used as an indicator of physical stress.

In two Lyalovo individuals out of four (burials 22 and 42) the symptom was observed in the thoracic vertebrae.

Among the six early Volosovo skeletons, Schmorl nodes are present in three. In one of these (burial 15), the lower thoracic vertebrae are affected, and in two (burials 5 and 10), the lumbar ones. In the late Volosovo group, too, the symptom was registered in the lower thoracic and lumbar vertebrae.

Any conclusions would be tentative due to insufficient sample sizes. The reduction of frequency of this stress indicator in later skeletons, however, is worth mentioning.

Integration of data concerning various indicators. If one considers stress indicators in people from Sakhtysh IIa, some trends in the intensity of stressors can be noticed. The comparison of the three groups demonstrates that Lyalovo, early Volosovo, and late Volosovo populations differed with respect to living standards and lifestyles.

Frequencies of traits such as vascular changes in cranial bones, orbital osteoporosis, and periostitis, suggest that Lyalovo people lived under more favorable conditions. This, however, disagrees with the high occurrence of enamel hypoplasia, attesting to stress experienced by Lyalovo children.

As noticed above, vascular changes in cranial bones are due to local cooling. This is consistent with the fact that the condition is present in all Volosovo crania, since these people lived under harsher climatic

Table 8. Concentrations of elements in human bone samples from the Lyalovo burials in Sakhtysh IIa (ppm)

Burial N	Sex	Age	Sr	Cu	Zn
12	Male	30 – 40	28 45	51 81	284 97
29	»	30 – 40	37 84	27 91	–
40	»	30 – 40	43 80	41 86	547 54
42	»	25 – 30	30 76	20 34	–
16	Female	20 – 25	23 43	34 46	224 01
22	»	20 – 25	22 28	27 04	367 70
43	Child	5 – 9	35 73	35 73	309 65
X			31 75	34 16	346 37

Table 9. Concentrations of elements in human bone samples from early Volosovo burials in Sakhtysh IIa (ppm)

Burial N	Sex	Age	Sr	Cu	Zn
1	Male	30 – 35	41 46	26 51	843 68
5	»	40 – 45	29 59	25 50	391 11
14	»	35 – 40	26 38	16 49	219 84
15	»	30 – 35	45 07	24.50	440 96
28	»	35 – 40	47 71	37 66	62 77
2	Female	30 – 35	29 99	18 43	639 21
X			36 70	24 85	432 93

conditions (Spiridonova, Engovatova, 1997). Orbital osteoporosis and periostitis are caused by nonspecific infections and anaemias. Judging by these indicators, Lyalovo people lived under more favorable conditions, and early Volosovo people were subjected to the heaviest stress.

The high occurrence of degenerative symptoms on the articular surfaces and that of periostitic symptoms on tibiae in the early Volosovo group is an unambiguous proof of increased stress caused by adaptation to a new habitat. While some hypotheses concerning the nature of this stress have been proposed, none can be regarded as the most plausible at present.

Degenerative changes in the joints of the shoulder girdle and of the upper extremities are the most frequent in the early Volosovo group, possibly attesting to heavier mechanical stress. Probably early Volosovo lifestyle included the hardest physical exercise. However, reactive symptoms in the skeleton may result not only from physical stress, but also from low temperature and high humidity. It cannot be ruled out, then, that the harsher climate affected health status and skeletal status in particular.

The lifestyles of foraging populations are very plastic and can basically be viewed as adaptations to specific ways of procuring food.

Reconstruction of diet. Spectral analyses of bone samples make it possible to assess the diet of people buried at Sakhtysh IIa. Individual data and averages are given in tables 8 – 10. Features that are the most specific of this group are high concentrations of zinc and copper, which is typical of Mesolithic and Neolithic populations (Arrenius, 1990: 15; Liden, 1990: 21). High levels of these elements are due to a large amount of animal proteins in the diet. A more detailed dietary reconstruction appears possible, though.

The high content of copper in bones attests to the consumption of mollusks, insects, and crustaceans (Liden, 1990: 22), whereas the high content of zinc (100 – 250 ppm) suggests that mammals, primarily land ones, were the principal source of food. The concentrations of zinc in bone samples from Sakhtysh IIa are exceptionally high (up to 700 – 800 ppm). These figures are too high to be explained only by eating meat. According to some data, the diet might have included large amounts of fish or certain organs of mammals, specifically liver (Underwood, 1977: 213).

Table 10. Concentrations of elements in human bone samples from late Volosovo burials in Sakhtysh IIa (ppm)

Burial N	Age	Sr	Cu	Zn
		Males		
24	20 – 25	27 86	35 21	153 09
31	40 – 45	24 50	75 50	350 00
32	35 – 40	32 41	38 89	496 97
34	30 – 35	38 85	38 35	489 99
36a	30 – 40	28 93	20 46	313 83
36б	30 – 40	15 59	37 63	470 35
39	25 – 30	33 93	36 10	342 96
44	35 – 45	34 97	34 98	446 94
45	30 – 40	28 25	30 90	375 19
62	30 – 40	42 45	27 99	419 91
X		30 72	37 60	348 40
		Females		
7	20 – 25	10 23	23 17	304 88
8	30 – 40	44 36	28 43	511 80
19	30 – 35	31 60	29 62	493 83
21	20 – 25	27 39	35 60	635 88
25	30 – 35	28 77	27 40	671 42
37	25 – 45	17 89	24 10	385 68
46	30 – 40	45 65	35 97	626 50
50	45 – 50	31 17	23 37	405 17
57	45 – 50	23 83	23 47	288 88
X		28 98	37 72	488 16
		Children		
51	10 – 14	29 33	34 50	690 10
53	3 – 4	22 19	37 72	488 16
X		25 76	36 11	589 13

Low content of strontium in bone samples from Sakhtysh IIa attests to a low share of vegetable products in the ration.

Especially noteworthy is the range of individual variation in the content of zinc (153 – 843 ppm), copper (16 – 75 ppm), and strontium (10 – 43 ppm). Such fluctuations are not seen in most other populations studied, for instance in medieval ones (Kozlovskaja, 1993: 102). The probable reason is the diversity of food and the existence of vastly different food sources. The same range of individual variation in the concentration of chemical elements in human bones was observed in the Neolithic populations of Sweden (Arrenius, 1990. 19). An even higher variation characterizes Mesolithic groups of the same territory (Ibid.: 18). Thus, the concentration of copper in human bone samples from Skateholm ranges from 17 to 284 ppm, and that of zinc, from 98 to 832 ppm.

Dietary reconstructions for the Sakhtysh IIa population (based on the same indicators) is generally consistent with conclusions made on the basis of faunal data for Volosovo sites. And, according to Krainov (1987: 19), information concerning the foraging economy of the Volosovo people may be gained from the topography of sites, kitchen remains, and the nature of artifacts. All Volosovo sites are situated near the reservoirs, attesting to the predominance of fishing in the economy.

What additional information may be gained from the present study? Based on the stratigraphy of Sakhtysh IIa burial ground, we can assess temporal

Table 11. Diachronic trends in concentrations of elements in human bone samples from Sakhtysh IIa (ppm)

Culture	Sex	n	Sr	Cu	Zn
Lyalovo	Male	3	29.60	36.07	284.97
	Female	3	22.85	30.75	295.85
Early Volosovo	Male	5	38.99	26.43	391.67
	Female	1	29.99	18.43	639.67
Late Volosovo	Male	9	30.72	37.60	348.40
	Female	10	28.98	27.90	480.45

trends, if any, in the concentration of chemical elements indicative of diet. As the data in Table 11 suggest, over the period spanning Lyalovo, early Volosovo, and Volosovo stage proper, no appreciable changes in the structure of diet can be noticed. Just one difference is evident: the concentration of zinc is higher in the Volosovo group compared to the Lyalovo group. This may be suggestive of the increased share of fish in the diet. Perhaps the Lyalovo people relied mostly on hunting, whereas Volosovo people preferred to fish.

The analysis of quality and composition of diet in various age cohorts of adults reveals no trends in the distribution of the indicators used. Perhaps there was no age differentiation among the adults, at least with respect to food quality.

The comparison of concentrations of dietary indicators in males and females reveals some differences. Females exhibit higher concentrations of zinc and lower concentrations of copper, whereas males are characterized by an opposite tendency, evidencing considerable dietary differentiation. Specifically, the principal source of animal protein for males was fish and meat of land mammals, and fresh-water mollusks, whereas females ate mostly fish.

Males exhibit regularly higher concentrations of strontium in their bone tissue, but the tendency is too weak compared to the large individual variation. Whether or not this tendency attests to sex differences in the proportion of vegetable food in the diet is impossible to say. At least in Volosovo people, no such differences were present.

Interestingly, diachronic trends are to some extent paralleled by sex differences. Because the heavier reliance on fishing concerned mostly females, it might be suggested that this was due to relative easiness and safety of this way of procuring food. Possibly the increased share of fishing in the economy was a prerequisite for a more sedentary existence.

There are reasons to believe that late Volosovo people achieved some success in the sophistication of economic adaptations developed by their ancestors. Judging by the indicators of stress markers (those of cumulative and occasional stress pooled), late Volosovo lifestyles guaranteed a longer life and better health.

Peculiarities in the dietary models of Mesolithic and Neolithic populations of the forest-steppe and steppe zone of East Europe

Different tendencies in the search for foraging strategies are shown by late Stone Age foragers living in more open habitats such as broad-leafed forest, forest-steppe, and steppe.

Isotopic analysis of human bone samples from Mesolithic and Neolithic burials in the Zaporozhye Region has made it possible to reconstruct the diet of these populations. The results indicate that the diet of people represented by widely-known burial grounds such as Dereivka, Marievka, Vasilyevka, and Yasinovatka was similar (Lille, Richards, 2000). Values of $\delta^{13}C$ range from –23.6 to –21.7, attesting to the use of vegetable food and fresh-water fish. The share of meat in the diet was minor. The level of nitrogen isotope ^{15}N, too, is indicative of the reliance on fresh-water fish. During the Mesolithic and Neolithic, certain changes in dietary structure can be traced (Lille, 1996). Over the span of 10 – 4 ka BP, a peculiar pattern emerges in these regions. While the Mesolithic dietary profile was comparable to that of the northern forest dwellers, the major food sources being land mammals, fish, mollusks, and plants, the transition to the Neolithic resulted in the increase of vegetable food (Table 12). This prompted Jacobs (1994) to suggest that agriculture in the Ukraine emerged earlier than previously believed.

The wide use of wild plants leads to heavy dental attrition. The researchers point to the high occurrence of dental calculus (35 – 38 (?) % in the Mesolithic, *vs.* 47 – 87% in the Neolithic), attesting to the permanent use of viscous food. Lack of dental caries cannot be directly related to any specific dietary type. However, the large amount of coarse fibrous food does

Table 12. Changes in food sources over the Mesolithic and Neolithic in the Ukraine (after (Lille, 1996))

Mesolithic	Late Mesolithic – Early Neolithic	Neolithic
Land mammals	Lesser role of land mammals	Less vegetable food (?)
Fish/mollusks	Fish/mollusks	Fish/mollusks
Wild plants	More vegetable food	Lesser role of land mammals

not promote the development of bacterial flora in the oral cavity.

The analysis of skeletons from the Zaporozhye Region revealed considerable sex differences in the occurrence of dental calculus, which is much more frequent in males (Lille, Richards, 2000). This is explained by a different structure of diet: the food eaten by males is supposed to have contained more proteins compared to female food. The difference is more pronounced in the Neolithic populations than in the Mesolithic ones Enamel hypoplasia in Mesolithic people buried at Vasilyevka-2 and 3 is estimated at 7% and 22%, respectively (males and females pooled), whereas frequencies in the Neolithic populations vary from zero (Osipovka) to 19% (Yasinovatka). The occurrence of these indicators of early stress, then, is considerably lower compared to the late Neolithic sample from Sakhtysh, but higher than in the Mesolithic series from Minino I (Buzhilova, 2001).

Sedentary hunter-gatherers of the New World (steppe and semidesert)

Comprehensive archaeological studies in the Tehuacan Valley, Mexico, conducted in the early 1960s, provided information concerning the lifestyles of hunter-gatherers of the steppe and semidesert areas of the New World (Byers, 1967). The analysis of human skeletal remains, fauna and flora, coprolites, and the study of cultural deposits in five caves in this highland valley provided a solid database for the reconstruction of Mesoamerican aboriginal lifestyles in the late Stone Age. Although the project initially focused on the transition to agriculture in these areas, extremely rich information was gained with respect to earlier stages as well. The studies span the period from 8500 to 1500 BC.

These studies, unprecedented in scale, allowed a reconstruction of the dietary structure in a population with a foraging economy, as well as principal techniques of preparing food.

Tehuacan foragers mostly hunted two animals: white-tailed deer and rabbits (Flannery, 1967). Here as elsewhere, then, the hunters' preference for meat of herbivores is evident. The two animals played an approximately equal role in the diet from 6500 BC to AD 1000. In earlier and later periods, the rabbit was preferred. From the 2nd millennium BC onward, the role of the white-tailed deer showed a dramatic decrease, and that of the rabbit remained the same. The share of fish was negligible, possibly due to arid climate.

Vegetable food was no less important than was the animal one. According to the results of pollen analysis, several dozens plants were exploited, and their edible parts were fruit, flowers, stalks, seeds, and leaves, depending on the species. While the earliest forms of domesticated maize are known from the 7th millennium BC, it was not until the mid-4th millennium BC that cultivated plants began to make up an appreciable part of the ration. Before that, the principal food of Tehuacan foragers consisted of wild plants and meat in roughly equal proportions. During the period of 8000 – 5500 BC, the meat of white-tailed deer and rabbits predominated in the diet. Later, people mostly consumed wild plants. Notably, tendencies that first became evident in the late Stone Age are even more pronounced in subsequent periods: people specialized in vegetarian diet, whereas animal proteins played a negligible role. The role of invertebrate animals, too, was minor (Callen, 1967).

Prehistoric foragers of Mesoamerican highlands, then, displayed peculiar dietary profiles. Specifically, they consumed numerous wild plants, whereas hunting was less important. Possibly, this ancient tradition accounts for the specific type of producing economy that originated in Mexico, with agriculture playing the key role, and animal-breeding being practiced on a very minor scale with virtually no mobile forms of pastoralism.

Reconstruction of dietary types of the Near Eastern Mesolithic populations (steppe and semi-desert)

The analyses of bones from the Mesolithic Natufian sites and those representing the Pre-Pottery Neolithic population of Jericho allowed a tentative reconstruction of the diet of the Levantine hunter-gatherers in the 10th – 6th millennia BC. In Natufian sites and in those of the Pre-Pottery Neolithic A, bones of gazelles regularly predominate among the faunal remains. Only with the transition to the Pre-Pottery Neolithic

Table 13. Body length of Mesolithic people of coastal and inland West Europe (after (Meiklejohn, Schentag, Venema, 1984))

Region	Sex	n	Body length
Coastal	Male	48	168 11
	Female	36	155 13
Inland	Male	17	169 55
	Female	10	158 24

B was the gazelle replaced by other animals such as bovids (Smith, Bar-Yosef, Sillen, 1984). The proportion of strontium and calcium in bones of Mesolithic Natufians attests to a mixed vegetable and meat diet After the transition to the Pre-Pottery Neolithic B, the share of the protein component increases. The occurrence of dental caries in the Natufians is relatively low (0 3 – 7.6% in various populations), that of enamel hypoplasia ranges from 10 to 60%, and that of orbital osteoporosis is 40% in adults and 50% in children (all Natufian groups pooled). Apparently, in the Mesolithic, too, the living conditions varied across populations of these regions. It is rather difficult, then, to make a general assessment concerning the entire Levantine population. The quality of life of the Natufians should probably be regarded as a local peculiarity.

Iraq and Iran are highly important for tracing the origins of producing economy. Unfortunately, the evidence concerning dietary profiles of ancient populations inhabiting these territories is quite fragmentary (Rathbun, 1984). Ca/Sr relationships in the skeletal tissue of individuals from the Neolithic sites of Gandzh Dareh (5.03) and Hadzhi Firuz (6.7) suggest that the diet of the Neolithic Iranians included mostly meat of land mammals, the proportion of plants being small. Also, the writer notes that the transition from foraging to agriculture in that territory was not accompanied by major changes in the structure of diet. It is suggested that small horned animals were a more important source of food for people of Zagros than for those of Levant. Compared to the later Neolithic populations, the pattern may be suggestive of relatively favorable living conditions. As far as human remains are concerned, then, there is no reason to believe that the shift to agriculture was prompted by a dramatic shortage of food resources.

Conclusion

Perhaps the general tendency for a milder climate resulted in a lesser energy requirement of the human body. Thanks to that, high calorie content and high nutritive value of food became less crucial than they were before, and the tendency for a wider exploitation of various food resources, seen already in the Upper Paleolithic, was further developed. Two relatively new sources of protein began to be exploited on a larger scale: small fish and invertebrates. Because all these can be procured without any risk, they became a reliable food source during the hardest seasons. Availability of easily procurable food makes life considerably easier for the least protected community members – women and children. As a result, populations, especially those of Neolithic hunter-gatherers, increased in size.

It is rather difficult to evaluate general tendencies in physical development of the Mesolithic and Neolithic people, because of considerable variation. Pooled data suggest that body length decreased compared to the Upper Paleolithic (Angel, 1984). The comparison of Mesolithic populations from coastal and inland regions of West Europe points to a somewhat lesser body length of coastal dwellers than that of the inhabitants of the inland regions (Table 13). This may be interpreted as an evidence of decreased physical development caused by ecological factors. Another explanation is that people living in coastal and inland areas were genetically different.

The present review focused on populations inhabiting coastal zones and living under moderate climate as well as high-latitude people and those of the forest zone with a moderate climate This is due not only to the fact that most available information concerns these specific regions, but also to the actual situation. As noted above, the largest environmental changes occurred in periglacial areas. More southern territories were less affected by general warming and increased humidity. Perhaps the Mesolithic can be regarded as the heyday of undifferentiated foraging communities practicing hunting, fishing, and gathering. The tendency to exploit various food resources, seen already in the Upper Paleolithic, became even more pronounced in the subsequent Mesolithic period. Maintaining balance between all the available resources of food over considerable time spans was a difficult task. Seasonal fluctuations in principal resources promoted the conservation of this variability. Seasonality and variation in the diet are the most expressed in coastal landscapes of moderate and high latitudes. This may be the reason why the number of coastal sites in the Mesolithic is much higher than that of inland ones.

People living in regions with less expressed seasonal fluctuations of the principal food resources can (and probably must) have a less variable diet. From the standpoint of paleodietology, reduced variation of diet may have been the major factor responsible for the transition to producing economy.

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LIST OF ABBREVIATIONS

AN SSSR – the USSR Academy of Sciences

BF SO RAN – Buryat Division of the Siberian Branch, Russian Academy of Sciences

DVO AN SSSR – Far Eastern Branch of the USSR Academy of Sciences

IAE SO RAN – Institute of Archaeology and Ethnography, Siberian Branch of the Russian Academy of Sciences (Novosibirsk)

IA RAN – Institute of Archaeology, Russian Academy of Sciences (Moscow)

IIFF – Institute of History, Philology, and Philosophy, Siberian Branch of the USSR Academy of Sciences (Novosibirsk)

IIMK RAN – Institute of History of Material Culture, Russian Academy of Sciences (St. Petersburg)

KSIIMK – Brief Communications of the Institute of History of Material Culture, Russian Academy of Sciences

MAE – Museum of Anthropology and Ethnography, Russian Academy of Sciences (St. Petersburg)

RAN – Russian Academy of Sciences

SB RAS – Siberian Branch of the Russian Academy of Sciences

UrO RAN – Uralian Branch of the Russian Academy of Sciences

Notes to Contributors

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One hundred and fifty-one Russian companies from fourteen cities (Moscow, St. Petersburg, Novosibirsk, Omsk, Krasnoyarsk, Ekaterinburg, and others), foreign publishers from Great Britain, the Republic of Korea, and China, as well as thirty-four official representatives of foreign companies participated in the exhibition.

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The contest "Golden Medal of the Siberian Fair" took place at the end of the exhibition. The international scientific journal ***Archaeology, Ethnology & Anthropology of Eurasia*** and the monograph ***Phenomenon of the Altai Mummies*** (under the editorship of Academicians A.P. Derevianko and V.I. Molodin), issued by the Institute of Archaeology and Ethnography Publication and Printing Center, both won Grand Golden Medals in the category "Special Literature (scientific, business, educational)" as high-quality editions.

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DISCUSSION

THE ISSUE OF THE MIDDLE TO UPPER PALEOLITHIC TRANSITION

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PRINCIPAL TECHNIQUES OF SECONDARY REDUCTION OF STONE TOOLS IN PALEOLITHIC INDUSTRIES OF GORNY ALTAI *

Introduction

The abundance of stratified archaeological sites in Gorny Altai, a region situated on the border between North and Central Asia, makes it possible to trace the evolution of Paleolithic cultural traditions in this area. The earliest sites in Gorny Altai are especially relevant for the discussion of the transition from the Middle to the Upper Paleolithic. Stratified cave and open-air sites have yielded unique materials that have provided a basis for reconstructing the transformation of Middle Paleolithic to Upper Paleolithic industries (Derevianko et al., 1998; Derevianko, Petrin, Rybin, 2000; Derevianko, 2001; Shunkov, 2001; Derevianko, Shunkov, 2002).

The present article focuses on techniques of retouch noted in the industries from key Paleolithic stratified sites, including Kara-Bom, Ust-Karakol-1, and Denisova Cave. Here, we do not consider other techniques of secondary reduction, such as *encoche*, the burin spall technique, fragmentation, hewing, and direct percussion, which will be analyzed separately.

J. Boucher De Perthes in the mid-1800s provided the first descriptions of retouch. More recently, several generations of West European researchers have addressed the morphological analysis of retouch. In the mid to late 1900s, Bordes (1961), Tixier (1963), Leroi-Gourhan (1964), Leroi-Gourhan et al. (1966), Brezillon (1968), H. de Lumley (Lumley, Lich, 1972), Dibble (1988), Debenath and Dibble (1994), and Inizan (Inizan, Roche, Tixier, 1992) elaborated some of the most detailed systems of description and interpretation of secondary reduction of stone tools.

Russian specialists adapted previously developed methods of analysis of reduction techniques to specific Paleolithic industries (e.g., (Medvedev, 1975; Liubin, 1977; Sinitsyn, 1977; Ginzburg, Gorenstein, Ranov, 1980; Shchelinsky, 1983; Golovanova, 1984; Vasiliev, 1986, 1996; Markin, 1986; Derevianko, Markin, 1992; Derevianko, Markin, Vasiliev, 1994; Chistyakov, 1996)). Based on these studies, a new system for the description of elements of retouch was suggested. Its basic features are described below.

The study of secondary modification of lithics (mainly retouch) is based on an approach whereby the tool is viewed as an integral system of interrelated elements. The following key characteristics of retouch are considered:

position on the blank (lateral side, proximal or distal margin, on break);

extension on the blank (area of the perimeter occupied by retouch);

dislocation on the plane (dorsal, ventral, alternating, bifacial, alternate);

combination of several types of retouch on the same blank.

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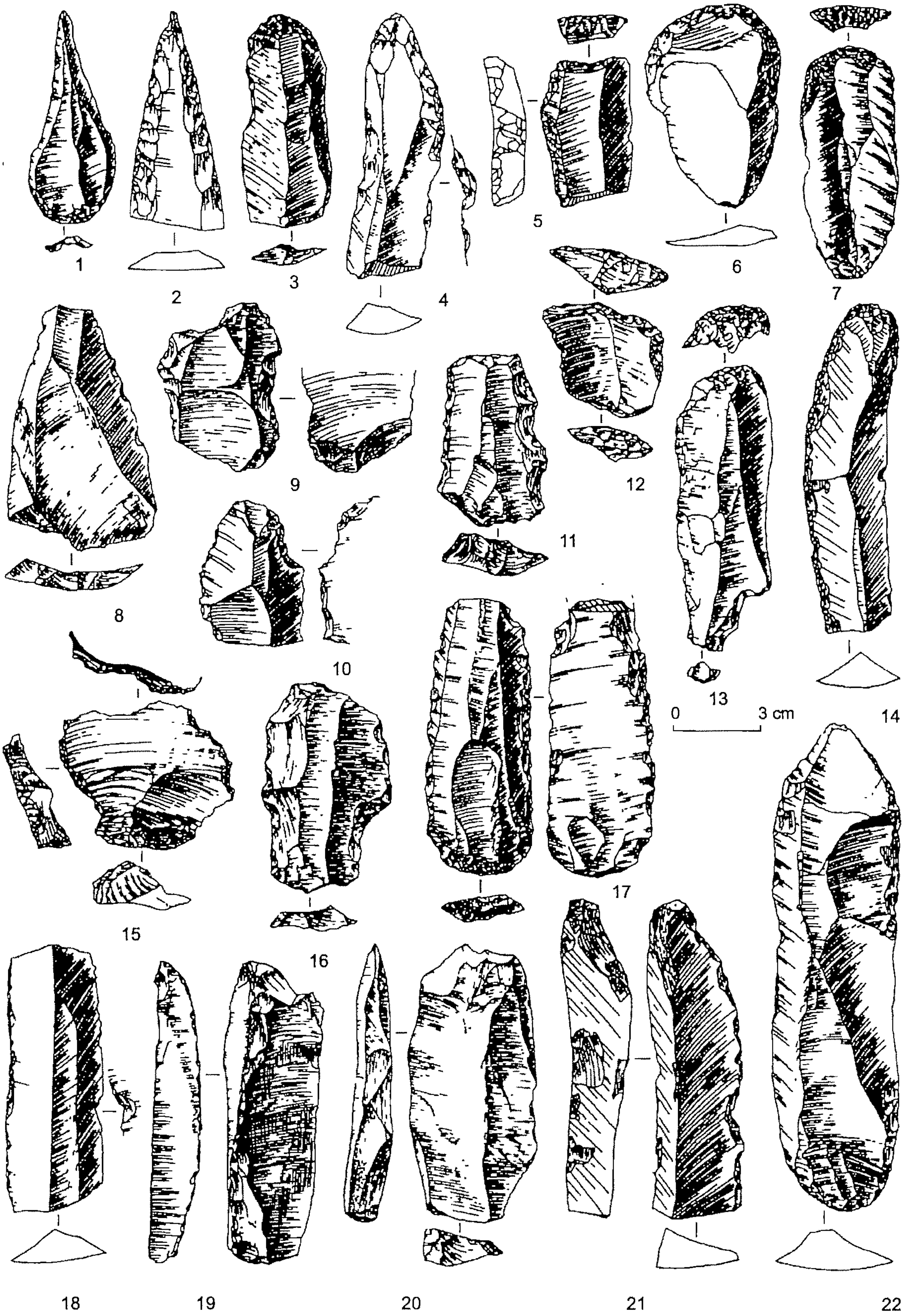

Fig 1. Stone tools from the Upper Paleolithic (*1 – 3, 5 – 7, 10, 12 – 15, 17, 18, 21, 22*) and the Middle Paleolithic (*4, 8, 9, 11, 16, 19, 20*) horizons of the Kara-Bom site.

The above features concern various morphological elements. When separate elements are described, the following features are noted:

position on the blank;
dislocation on the plane;
type of retouch (continuous, discontinuous, irregular);
inclination of retouch (distributed, flat, semi-abrupt, abrupt, vertical);
form of retouch (scalar, subparallel, parallel, stepped);
degree of modification of the surface (light, medium, heavy);
outline of the working edge (smooth, sinuous, denticulate);
type as to area covered (marginal, extensive, invasive);
size of facets, in millimeters.

These features are noted for each element of retouch in all tools. While they do not exhaust the whole range of characteristics, they do provide adequate information for comparative analysis.

Kara-Bom

The Paleolithic site of Kara-Bom is situated in the central Gorny Altai, in the Ursul River basin, between the villages of Yelo and Kayerlyk. The artifacts are associated with alluvial and proluvial deposits which form a terrace-like platform. The depth of the deposits was about 5 m. Two Middle Paleolithic and six Upper Paleolithic horizons have been identified. The lithic inventory of the site has enabled researchers to trace the evolution of stone artifacts over a span of 40 ka years, from the Middle to the Upper Paleolithic (Derevianko et al., 1998).

Because the site is stratified, because the lithic inventory developed within a single cultural tradition, and because virtually only one high-quality raw material (paleotypic aphyric effusives) was used throughout the period during which the site was occupied, it is possible to undertake a comparative analysis of the techniques of secondary modification in Middle and Upper Paleolithic industries.

Retouching in the Middle Paleolithic industries

Nearly all the Kara-Bom nuclei may be classified as Levallois (for detaching blades and flakes) and parallel (for detaching short blades) cores. The technological sequence of core reduction has been reconstructed, from recurrent unipolar for producing blades to unipolar recurrent convergent for producing points (Derevianko, Petrin, Rybin, 2000).

The tool kit comprises 111 specimens from Middle Paleolithic horizon 2 and 41 specimens from Middle Paleolithic horizon 1. Stable forms include Levallois points, retouched blades, knives, notched and denticulated tools, spurs, and *racloirs* (Fig. 1).

The principal secondary modification technique was retouch. While in Mousterian horizon 2, direct percussion is dominant, the pressure technique makes its first appearance. In the overlying Mousterian horizon 1, the latter technique is more common, and in the Upper Paleolithic horizons pressure flaking is quite frequent (Derevianko, Volkov, Petrin, 2001).

The analysis of retouch on Middle Paleolithic tools of various types reveals considerable similarity in secondary treatment techniques. The similarity is so marked that a typical combination of features can be given for virtually every category of tools. The retouch on blades is normally marginal, seldom extending to the dorsal part of the blank. It is generally discontinuous, flat or semi-abrupt, scalar, and occupies one quarter to one half of the tool's perimeter. On the lateral sides of Levallois points, dorsal discontinuous retouch sometimes extends over one half to three quarters of the piece's perimeter. Working edges of knives are formed by marginal, dorsal (often alternating), discontinuous, distributed, or flat retouch extending over one quarter to one half of the perimeter. Denticulate tools exhibit dorsal, scalar, regular, semi-abrupt, moderate retouch forming a denticulate edge. In notched tools, the retouch covers marginal zones and sometimes distal areas, and is dorsal or alternate, regular, sometimes discontinuous, semi-abrupt or abrupt, scalar, and heavy, occupying one half to three quarters of the perimeter. In spurs, mainly the distal part and lateral sides are retouched, and the retouch is irregular, abrupt or semi-abrupt, scalar, and heavy or moderate, extending over one quarter of the perimeter. The *racloirs* are retouched on their marginal-lateral areas by dorsal, regular, abrupt, scalar, and heavy or moderate retouch covering over one half to three quarters of the perimeter. *Grattoirs* are characterized by marginal, dorsal, regular, abrupt, scalar, moderate retouch extending over one half of their perimeters.

The study of secondary modification of Middle Paleolithic industries at Kara-Bom leads to the conclusion that retouch was usually situated in marginal-lateral areas, but often extended over the distal part or break, and is located on the dorsal side. In terms of type, retouch is more often regular than discontinuous; in terms of inclination, it is

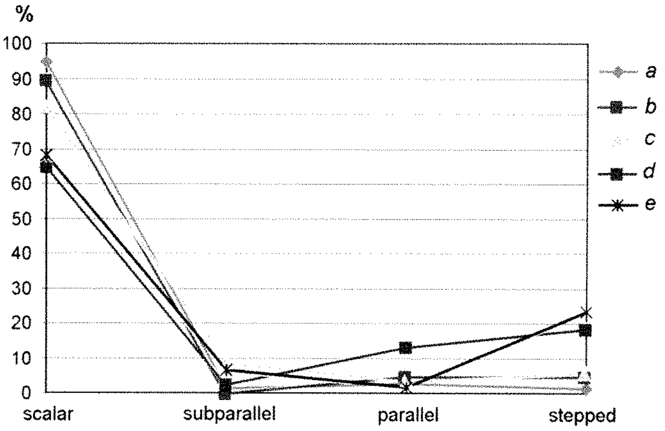

Fig. 2. Distribution of retouch by facet form, Kara-Bom.
Legends for fig. 2 – 8:
a – Middle Paleolithic horizon 2; *b* – Middle Paleolithic horizon 1; *c* – Upper Paleolithic occupation level 6;
d – Upper Paleolithic occupation level 5; *e* – Upper Paleolithic occupation levels 4 – 1.

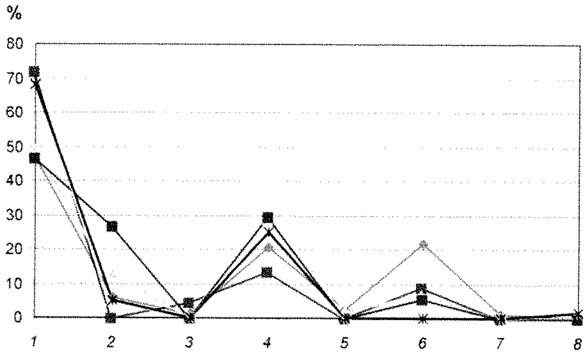

Fig. 3. Position of retouch on tools, Kara-Bom.
1 – lateral side, *2* – distal margin, *3* – on break, *4* – lateral side and distal margin, *5* – lateral side, distal margin, and on break,
6 – lateral side and on break, *7* – lateral side, on break, and proximal margin, *8* – proximal and distal margins.

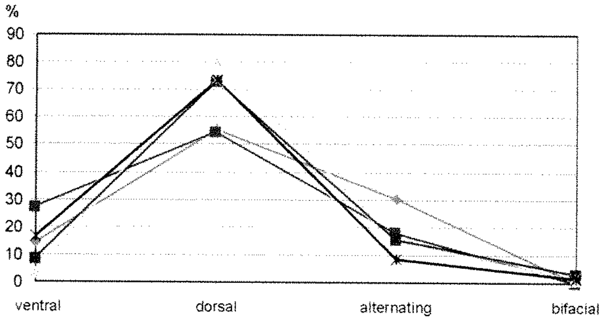

Fig. 4. Location of retouch on the plane of tools, Kara-Bom.

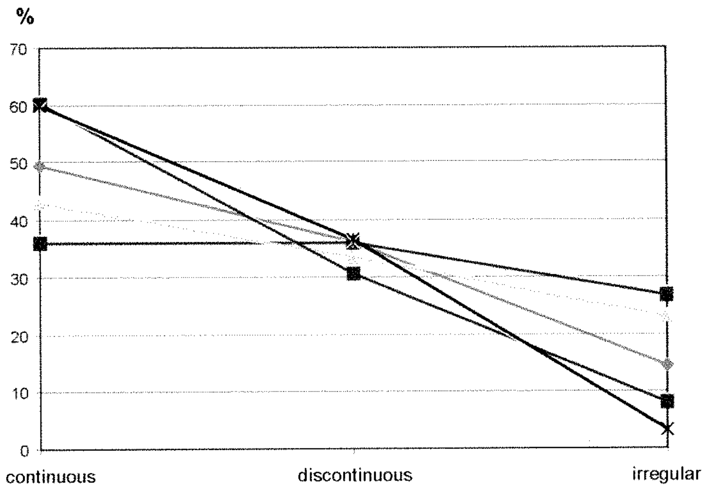

Fig. 5. Distribution of retouch by placement, Kara-Bom.

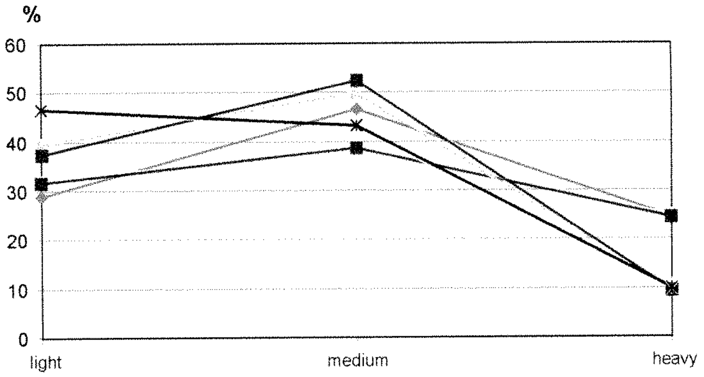

Fig. 6. Distribution of retouch by degree of modification of the tools' surface, Kara-Bom.

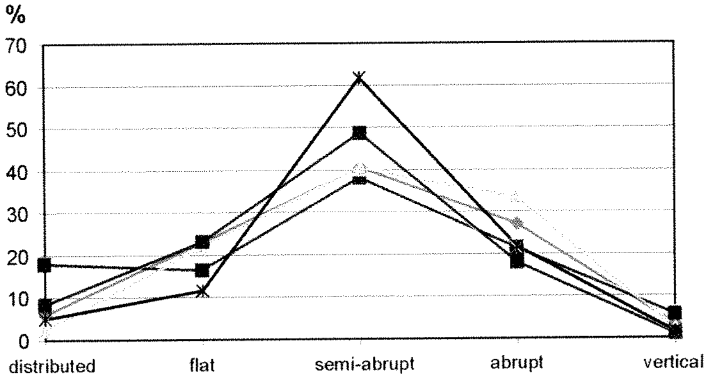

Fig. 7. Distribution of retouch by inclination, Kara-Bom.

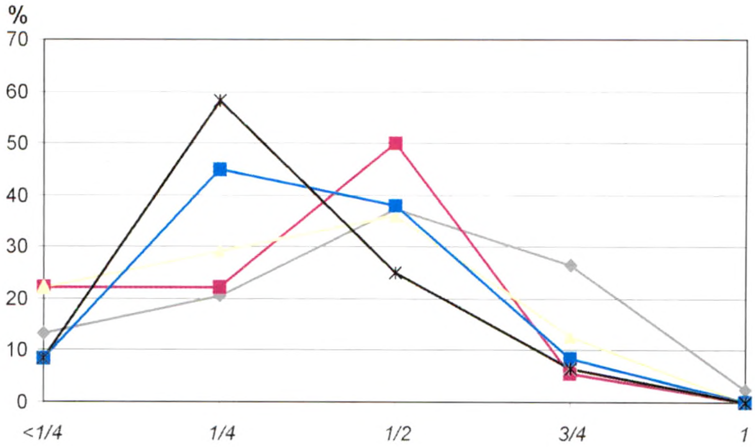

Fig. 8. Distribution of retouch by extent of placement, Kara-Bom.

semi-abrupt; and in terms of form, it is scalar, and moderate, mainly with equal facets, and covers about one half of the perimeter of the tool (Fig. 2 – 8).

Retouching in the Upper Paleolithic industries

In industries from the Upper Paleolithic horizons 6 and 5, all nuclei are parallel cores. In horizons 4 - 1, two principal groups of cores can be distinguished: (1) parallel flat-faced with flaking surfaces shifted to the narrow face and (2) narrow-face-flaked and proto-wedge-shaped (Derevianko, Petrin, Rybin, 2000).

The lithic inventory from horizon 6 comprises 128 specimens, that from horizon 5, 106 specimens, and that from horizons 4 – 1 (aggregated), 73. The number of Levallois-Mousterian tools in these collections is smaller, and new Upper Paleolithic forms appear. The principal categories are retouched blades, notched and denticulate pieces, *racloirs*, *grattoirs*, burins, knives, spurs, and retouched flakes (see Fig. 1).

Blades are mainly retouched along their lateral edges, sometimes distally. The retouch is dorsal, regular, and discontinuous (with the proportion of regular retouch steadily increasing from horizon 5 upward), semi-abrupt or abrupt, scalar or stepped, light, covering one quarter of the tool's perimeter. Knives are retouched along their working edge, and the retouch is dorsal, flat, and semi-abrupt, extending over one quarter of the piece's perimeter.

In industries recovered from Kara-Bom horizons 6 and 5, retouch is mainly discontinuous, whereas in collections from horizons 4 – 1, it is mostly regular. The form of retouch also changes: while in horizons 6 and 5 it is mostly scalar, in horizons 4 – 1 it is scalar or stepped.

In spurs and *percoirs*, the lateral sides and the distal margin are formed by light dorsal, scalar retouch occupying no more than one quarter of the tool's perimeter. The retouch on denticulate tools is regular or discontinuous, flat (less often semi-abrupt), scalar, and moderate. Notched tools are retouched along their lateral edges or on their distal margins, and the retouch is dorsal and alternating (the number of tools with alternating retouch sharply decreases in the upper horizons), discontinuous, semi-abrupt, scalar and light (or, less often, moderate), distributed over one quarter to one half of the tool's perimeter.

The retouch on burins is dorsal, discontinuous or regular, semi-abrupt, scalar, and light. In *grattoirs*, the lateral sides or distal margins (in end forms) are formed with dorsal, regular, abrupt or semi-abrupt, parallel, subparallel or scalar retouch, which is moderate or heavy. *Racloirs* are retouched along their lateral sides (sometimes also on their distal margins), and the retouch is dorsal, regular, abrupt or semi-abrupt, scalar, heavy or moderate. The retouch on flakes is marginal, dorsal, discontinuous, semi-abrupt or flat, and light, extending over one quarter of the piece's perimeter. A few Levallois points from horizons 6 and 5 exhibit dorsal, discontinuous, flat or semi-abrupt, scalar, light retouch occupying one half of their perimeters.

A feature typical mostly of Upper Paleolithic industries at Kara-Bom is that retouch is situated along the lateral edge of the tool, sometimes extending to the distal margin. It is usually dorsal, regular, scalar, subparallel, parallel or stepped, semi-abrupt or abrupt, and moderate, occupying one quarter to one half of the tool's perimeter (see Fig. 2 – 8).

The Kara-Bom variant of secondary reduction

Paleolithic industries from Kara-Bom demonstrate the development of the secondary reduction technique. While scalar retouch dominated, subparallel retouch is most frequent in horizons 6 and 4 – 1. Stepped retouch is also present, and its frequency appreciably increases in horizons 4 – 1. The number of tools exhibiting parallel retouch increases in the upper levels as well, but only up to horizon 5, after which it shows a sharp decrease (see Fig. 2).

In the Upper Paleolithic industries, the secondary reduction of blades changes. Specifically, a distinct group appears: blades with scalar retouch, which is often abrupt or semi-abrupt. In horizons 4 – 1, the predominant types of retouch are continuous, semi-abrupt, scalar or stepped, covering one quarter of the tools' perimeter. In the Upper Paleolithic industries, knives often display continuous scalar retouch, whereas the blades of Middle Paleolithic knives were virtually never subjected to secondary reduction. Notched tools in the Upper Paleolithic industries show less intense remodification in comparison with their Middle Paleolithic counterparts. The retouch becomes discontinuous, semi-abrupt, and light, and it occupies lesser portions of the tools' perimeter. In the Upper Paleolithic industries, the practice of forming a denticulate edge by means of alternate retouch was abandoned. In *racloirs*, the length of retouched edges decreases to one quarter of the perimeter, as opposed to one half to three quarters in Middle Paleolithic *racloirs*.

Concerning the general characteristics of retouch in the Kara-Bom Paleolithic industries, it is normally situated along the lateral side of the tool, frequently extending to the distal part or the break (retouching the proximal end is uncommon); and the proportion of retouched breaks gradually decreases through time (see Fig. 3). The dorsal side was usually retouched, and the proportion of dorsal retouch increases whereas that of alternate retouch decreases as one moves up the profile (see Fig. 4). Bifacial retouch is uncommon and is only seen on Upper Paleolithic tools. It is nearly always marginal, and in rare occasions (e.g., horizons 6 and 4 – 1) it covers the entire break or extends to it. Such retouch is mostly medium, large faceted and occasionally occurs on *racloirs* and notched tools. In the Upper Paleolithic industries, small retouch resulting from pressure flaking appears. Normally, such retouch is continuous, less often discontinuous or irregular. The proportion of continuous retouch gradually increases in the Upper Paleolithic horizons (see Fig. 5). This retouch is semi-abrupt (see Fig. 7), scalar (stepped retouch increases with time, see Fig. 2), light or moderate (see Fig. 6), and occupies one half of the tools' perimeter; in the upper horizon the proportion of tools occupying one quarter of the tools' perimeter increases (see Fig. 8).

Ust-Karakol-1

The Paleolithic site of Ust-Karakol-1 is situated in the piedmont zone of the northwestern Altai, in the Anui River valley, two kilometers upstream from Denisova Cave. The total depth of alluvial and proluvial deposits excavated reaches 6.5 m. During excavations, twenty habitation levels were identified, corresponding to successive stages of occupation, spanning a period from the early Middle Paleolithic to the late Upper Paleolithic. The Paleolithic industries attest to direct cultural continuity in techniques of primary flaking, secondary reduction, and typology (Shunkov, 2001; Derevianko, Shunkov, 2002).

Pebbles varying in quality, mainly sedimentary minerals such as aleurolites and paleotypic effusives (rhyolites and dacites), as well as hornfels, jasperoids, and quartzite, were employed as raw material.

Retouching in the Middle Paleolithic industries

Stone knapping in these industries was mainly based on the Levallois techniques, but the system of parallel flaking was employed as well. A total of 190 tools were found in Middle Paleolithic layers at Ust-Karakol-1. The most representative group includes Levallois tools. The remaining tools are *racloirs*,

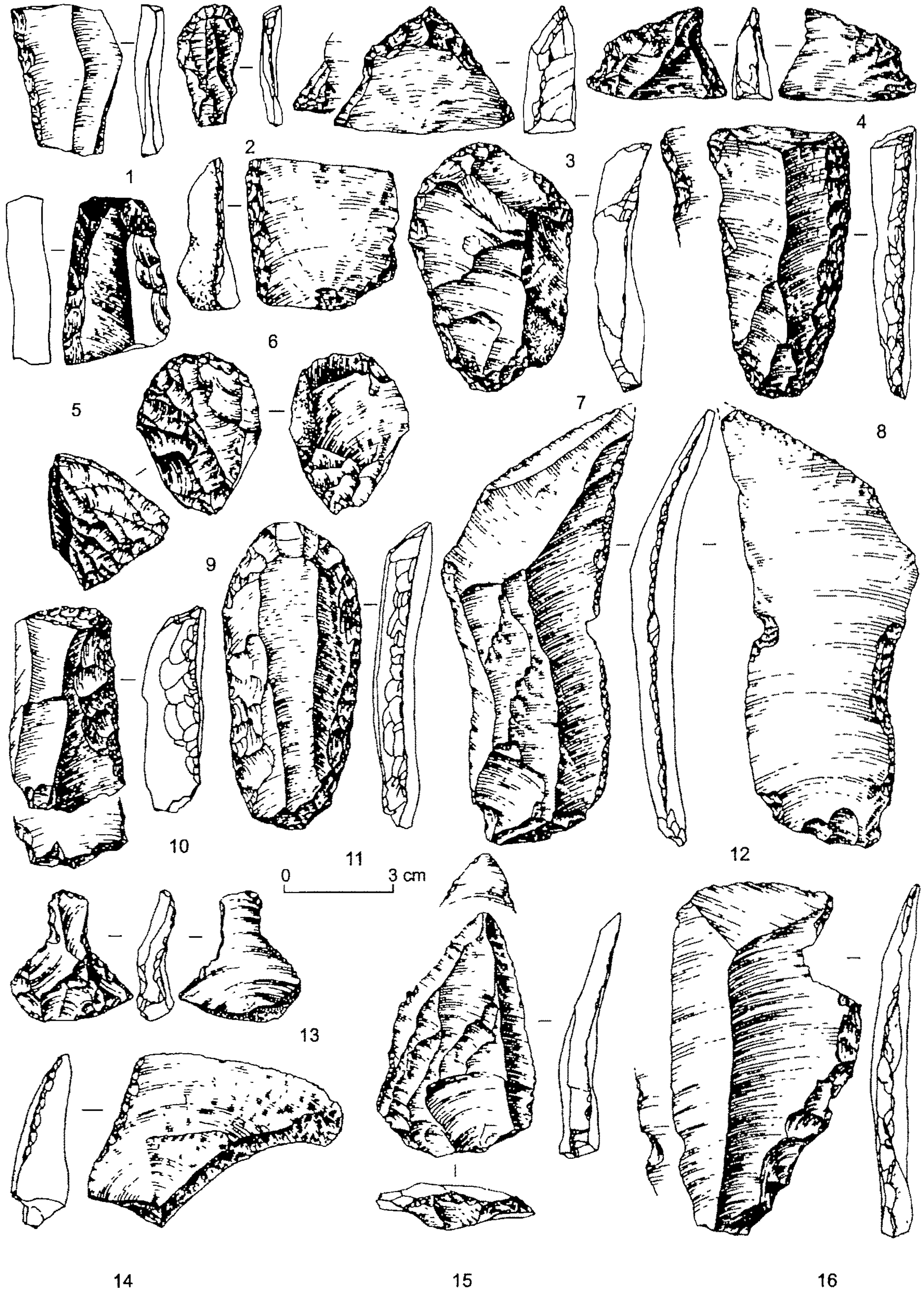

Fig. 9. Stone tools from the Upper Paleolithic (*1, 2, 4 – 12*) and the Middle Paleolithic (*3, 13 – 16*) layers of the Ust-Karakol-1 site

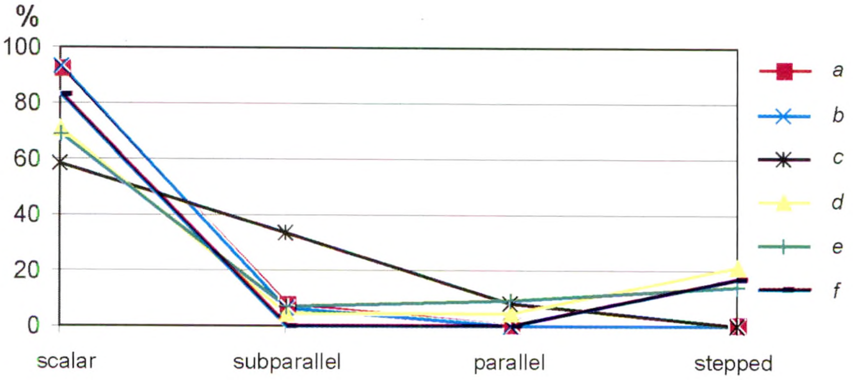

Fig. 10. Distribution of retouch by facet form, Ust-Karakol-1.
Legends for fig. 10 – 16:
a – layer 18, *b* – layers 17 – 13, *c* – layer 11, *d* – layer 10, *e* – layer 9, *f* – layer 8.

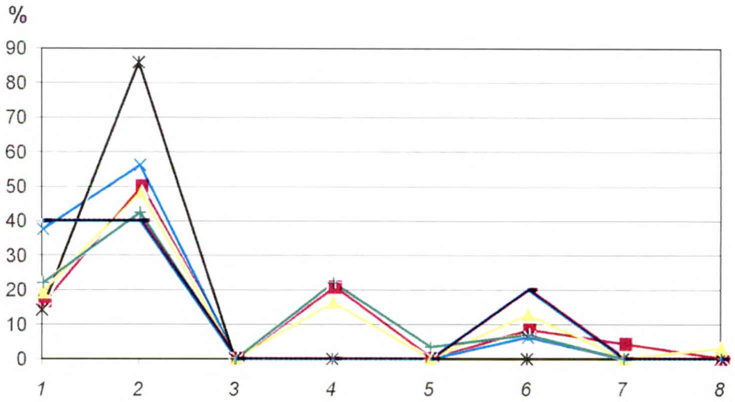

Fig. 11. Position of retouch on tools, Ust-Karakol-1.
1 – lateral sides, *2* – lateral side, *3* – proximal margin, *4* – distal margin, *5* – on break, *6* – lateral side and distal margin, *7* – lateral side, distal and proximal margins, *8* – lateral side and on break.

grattoirs, burins, knives, *percoirs*, denticulate and notched tools, *becs* and spurs, truncated blanks, retouched blades and flakes (Fig. 9).

Apart from utilization retouch, points, blades, and flakes of the Levallois type sometimes exhibit traces of intentional modification by means of marginal, dorsal, flat or semi-abrupt discontinuous light retouch covering one half of the tools' perimeter. *Racloirs* are retouched on their dorsal or ventral faces; the retouch is semi-abrupt or abrupt, scalar, and moderate, covering one quarter of the pieces' perimeter. *Grattoirs* typically display continuous semi-abrupt scalar, moderate retouch. The working edges of *percoirs* are trimmed with continuous, scalar, moderate retouch. In spurs, the working element exhibits interrupted or irregular, scalar, moderate to heavy retouch. *Becs* are formed through continuous or discontinuous, scalar, moderate retouch. Among notched tools, in addition to *encoches*, the dorsal sides of lateral edges sometimes show semi-abrupt, discontinuous, light retouch covering no more than one quarter of the tools' perimeter. The left lateral margins and the distal margins of denticulate tools reveal continuous or discontinuous, scalar, moderate retouch covering one quarter of the tools' perimeter. In truncated blanks, the section is trimmed with discontinuous, abrupt, scalar retouch on the ventral side. Blades are either retouched on their dorsal or ventral sides or have exhibit alternating retouch, which is usually scalar and covers one quarter of the artifacts' perimeter.

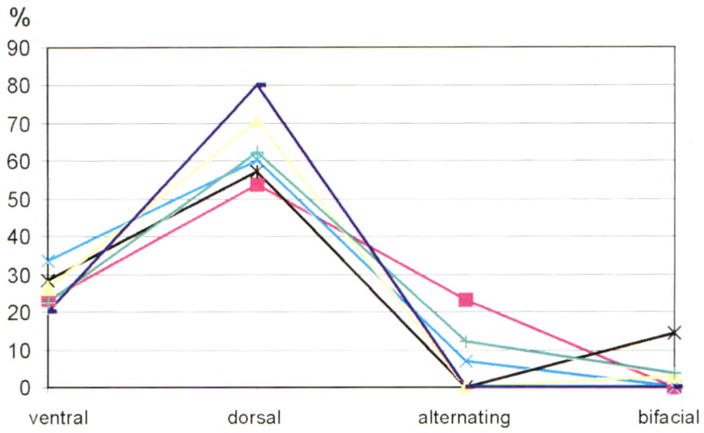

Fig. 12. Location of retouch on the plane of tools, Ust-Karakol-1.

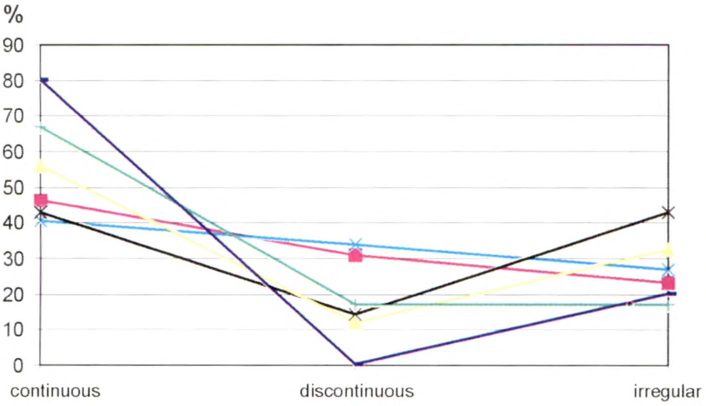

Fig. 13. Distribution of retouch by placement, Ust-Karakol-1.

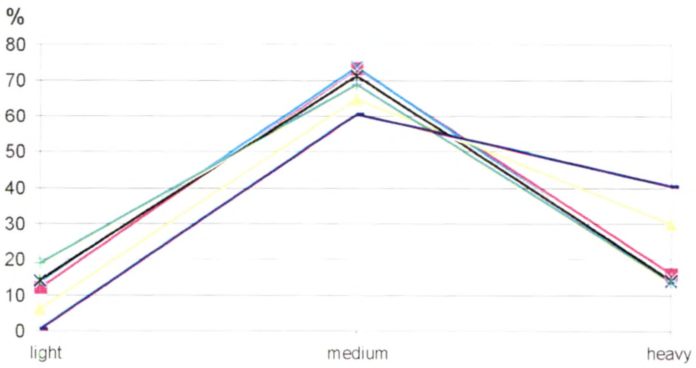

Fig. 14. Distribution of retouch by degree of modification of the tools' surface, Ust-Karakol-1.

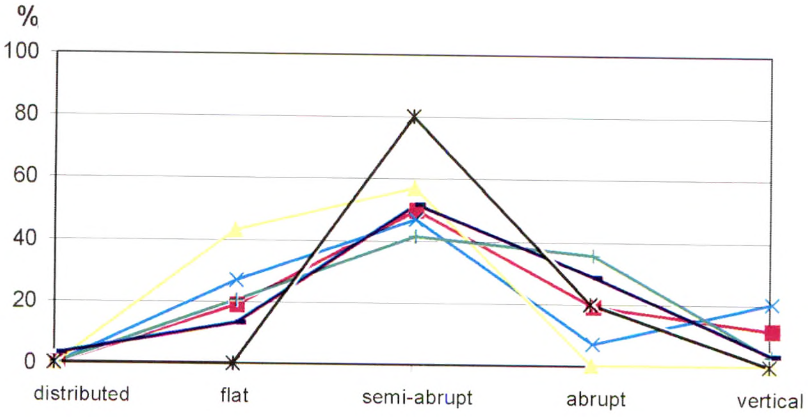

Fig. 15. Distribution of retouch by inclination, Ust-Karakol-1.

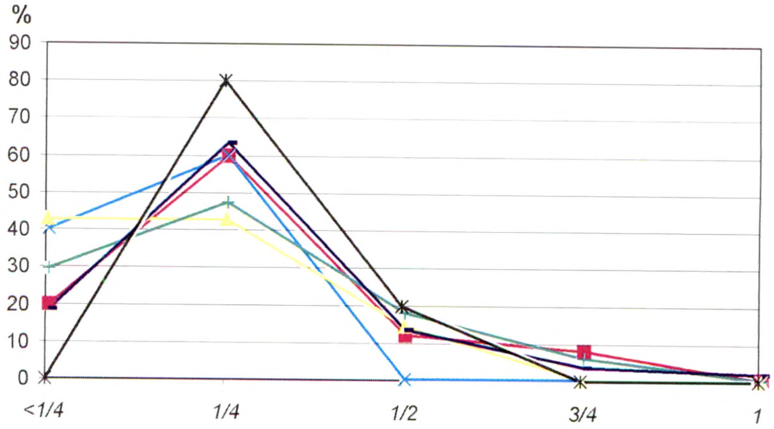

Fig. 16. Distribution of retouch by extent of placement, Ust-Karakol-1.

Retouch on flakes, if present, is situated on the lateral or distal side, and is discontinuous or irregular and light.

Generally, the retouch on Middle Paleolithic tools is situated along the lateral dorsal face. Predominant types include continuous and discontinuous, semi-abrupt, scalar, and moderate, and occupy one quarter of the tools' perimeter (Fig. 10 – 16).

Retouching in the Upper Paleolithic industries

Primary knapping in these industries is based on the detachment of blades from unidirectional and bidirectional cores, including prismatic blade nuclei. An important feature of this technique is the detachment of microblades from wedge-shaped and conical cores.

The lithic assemblage from the Upper Paleolithic layers includes 426 specimens. The most widely represented categories are *racloirs*, *grattoirs*, knives, burins, *percoirs*, spurs, and notched tools. Other tools include points, *becs*, denticulate tools, large retouched blades and backed microblades (see Fig. 9).

Racloirs are mostly retouched on the dorsal side along the lateral margin, and the retouch, which sometimes extends to the distal margin, is continuous, abrupt or semi-abrupt, scalar or stepped, and heavy, and occupies up to one half of the tools' perimeter. Various retouching techniques were used for trimming the edges of *grattoirs*. The retouch was dorsal, continuous, abrupt, scalar, parallel, sub-parallel or stepped, and either moderate or heavy. About half the burins, on their lateral dorsal parts, display additional retouch which is discontinuous, flat, scalar, and moderate to light, and occupies one quarter of the tools' perimeter. *Percoirs* and points display dorsal, semi-abrupt, scalar, light retouch. In some notched tools, lateral sides are trimmed with dorsal, semi-abrupt, scalar, moderate retouch. The edge of denticulate tools is mostly formed on the lateral dorsal side of the blank, and the retouch is continuous or discontinuous, scalar, and moderate. Working parts of spurs and *becs* are trimmed with a dorsal, continuous, abrupt, scalar or stepped, heavy retouch covering less than one quarter of the tools' perimeter. Backed microblades are retouched by pressure applied to the dorsal faces, and the retouch is flat or semi-abrupt, continuous, parallel, and moderate. Blades, when retouched, carry facets of dorsal, continuous or discontinuous, flat or semi-abrupt, scalar, moderate retouch on one or both lateral sides. Retouched flakes display discontinuous, abrupt, scalar, light and moderate retouch on their dorsal or ventral sides.

In Upper Paleolithic tools, then, generally one lateral dorsal side was trimmed with continuous, semi-abrupt, scalar, moderate retouch covering one quarter of the tools' perimeter (see Fig. 10 – 16). The frequency of parallel, sub-parallel, and particularly stepped retouch markedly increased in these industries.

The Ust-Karakol variant of secondary modification

The evolution of secondary modification techniques in the lithic industries of Ust-Karakol-1 documents a pattern of steadily increasing varieties of retouch. While in the Middle Paleolithic industries the working edges of tools were mostly formed through scalar, moderate retouch, Upper Paleolithic tools exhibit a wide range of combinations of sub-parallel, parallel, and stepped retouch, and the degree of modification produced is much greater than before.

In the Upper Paleolithic industries, the character of retouch of certain categories of tools changed. While in the Middle Paleolithic materials, lateral sides are trimmed with scalar retouch covering one-quarter of the tools' perimeter, the retouch in Upper Paleolithic tools usually occupies one half of the perimeter. Several Upper Paleolithic blades stand out due to heavy trimming of their lateral sides with continuous, scalar sub-parallel, and stepped heavy retouch. The sides of Middle Paleolithic *racloirs* are generally covered with scalar, moderate retouch along one quarter of the tools' perimeter. Upper Paleolithic *racloirs* carry stepped heavy retouch along three-quarters of their perimeters.

Ventral retouch at Ust-Karakol-1 was used for trimming *racloirs*, *percoirs*, spurs, and blades. This retouch is commonly continuous, scalar, infrequently sub-parallel, parallel and stepped, and moderate to heavy.

The general features of the retouching strategies observable in the Paleolithic industries of Ust-Karakol-1 are as follows. Retouch was mostly applied to the lateral side, sometimes extending to the distal margin of individual pieces (see Fig. 11). The dorsal side was usually retouched (see Fig. 12), and the retouch was continuous (the index of discontinuous retouch markedly decreases in the Upper Paleolithic industries; see Fig. 13), semi-abrupt, often flat and abrupt (see Fig. 15), scalar (see Fig. 10), moderate (see Fig. 14), and typically covered one quarter of the perimeter of the tool (see Fig. 16).

Denisova Cave

The cave is situated in the northwestern Gorny Altai, in the upper Anui River valley. In the central hall of the cave, a sequence of Pleistocene deposits up to 4.5 m deep has been excavated. The bottom of the stratigraphic profile consists of a succession of heavy pale-ocherous sandy loams. The middle is formed of laminated lense-like sediments of brownish and gray sandy loams. The uppermost part of the section consists of light pale-yellow loess-like sandy loams. The Pleistocene archaeological sequence is formed by deposits reflecting successive habitation levels dating back to the Middle Paleolithic and the early and final Upper Paleolithic (Derevianko, 2001; Shunkov, 2001).

The lithic industry of the cave was based on the exploitation of local raw materials, principally pebbles of sedimentary and volcanic minerals from alluvial deposits. Most artifacts are made of aleurolites and sandstone; effusives are common, and metamorphic rocks are less common.

Retouching in the Middle Paleolithic industries

Most cores recovered are parallel nuclei, some are of the Levallois type, and others are radial, narrow-

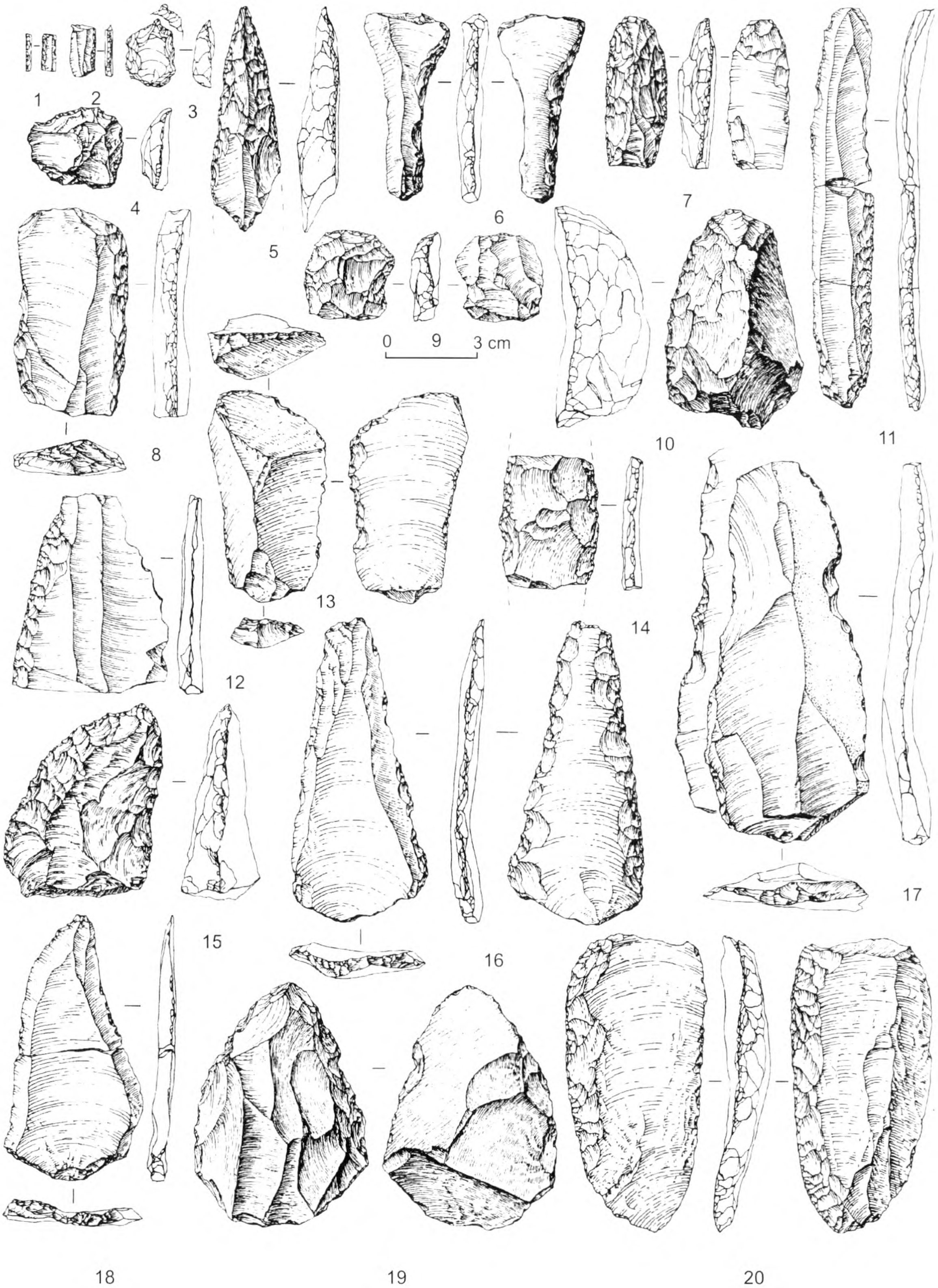

Fig. 17 Stone tools from the Upper Paleolithic (*1 – 4, 6, 7, 9 – 11, 14, 16*) and the Middle Paleolithic (*5, 8, 12, 13, 15, 17 – 20*) layers of Denisova Cave.

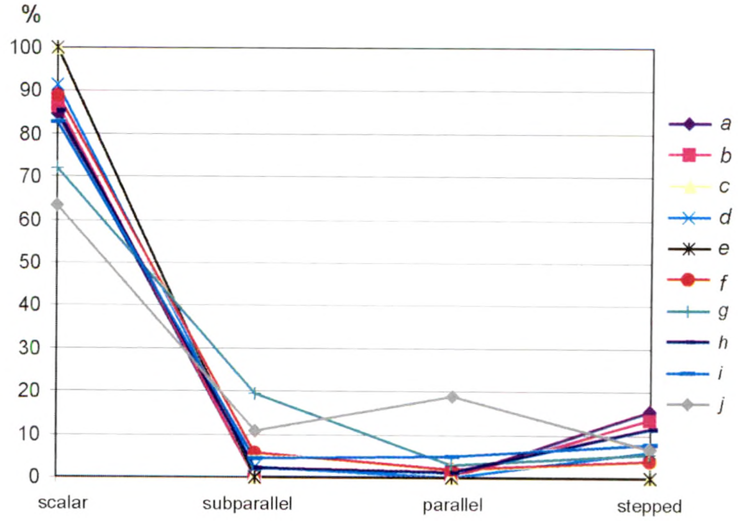

Fig. 18. Distribution of retouch by facet form, Denisova Cave.
Legends for fig. 18 – 24:
a – layer 22, *b* – layer 21, *c* – layer 20, *d* – layer 19, *e* – layer 17, *f* – layer 14, *g* – layer 13, *h* – layer 12, *i* – layer 11, *j* – layer 9.

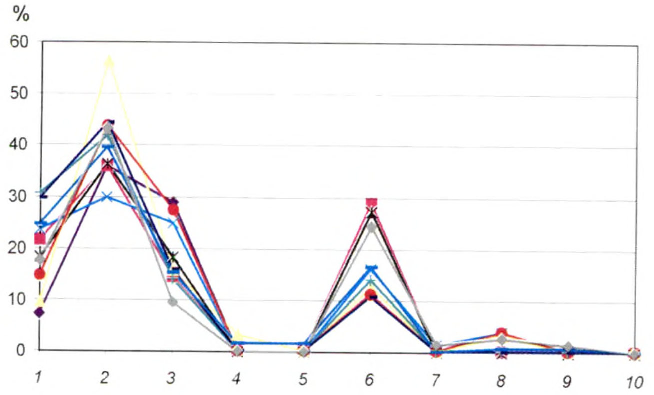

Fig. 19. Position of retouch on tools, Denisova Cave.
1 – lateral sides, *2* – lateral side, *3* – proximal margin, *4* – distal margin, *5* – on break, *6* – lateral side and distal margin, *7* – lateral side, distal margin, and on break, *8* – lateral side and proximal margin, *9* – lateral side and on break, *10* – distal and proximal margins.

faced, orthogonal, and irregular. The total number of Middle Paleolithic artifacts is 646.

The key types are Levallois tools, *racloirs* and *grattoirs*, denticulate and notched tools, spurs and beaks, and retouched blades and flakes (Fig. 17). Comparative analysis reveals the general features of secondary reduction and makes it possible to trace its development within each category of tools.

In some Levallois points, lateral sides are trimmed with dorsal and sometimes alternate semi-abrupt retouch covering one quarter to one half of the tool's perimeter. In the early Denisova industries

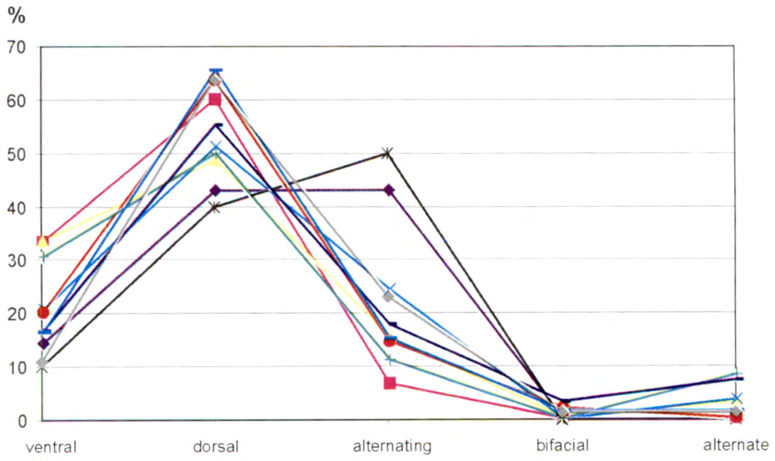

Fig. 20. Location of retouch on the plane of tools, Denisova Cave.

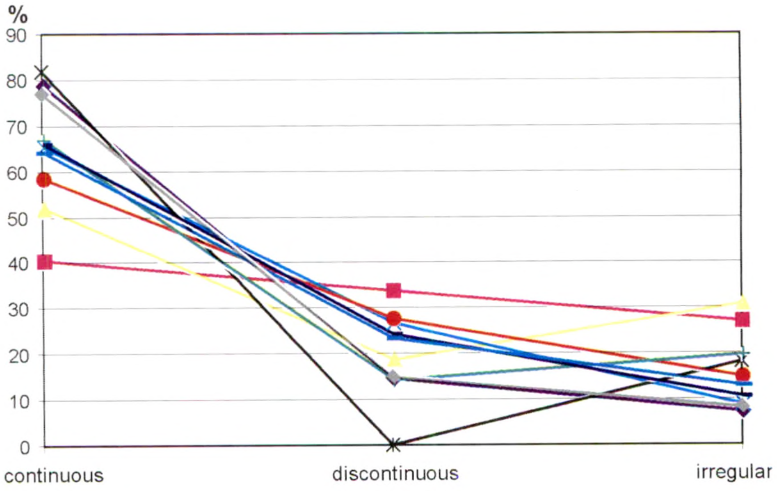

Fig. 21. Distribution of retouch by placement, Denisova Cave.

(up to layer 14), retouch was discontinuous and light, and in industries represented by layers 13 and 12, it was continuous, scalar, and moderate. Most *racloirs* are retouched along one lateral dorsal side, and the retouch is continuous, abrupt, scalar, and heavy, occupying one quarter to one half of the tools' perimeter. From Layer 13 upward, sub-parallel and stepped retouch is evident. The distinctive feature of this period is a relatively large number of *racloirs* bearing ventral retouch on the working edge. Edges of *grattoirs* are retouched on their dorsal sides, and the retouch is continuous, abrupt or vertical, scalar, sub-parallel or stepped, and heavy.

On denticulate and notched tools, the retouched areas are situated on the tools' lateral or distal sides, and the retouch is usually dorsal, but sometimes ventral (layer 20) and alternate (layers 20, 19, and 13). In most cases, it is semi-abrupt and scalar, covering one quarter to one half of the tools' perimeter (layers 21 and 19), the size of the facets often reaching 6 mm or more. In the lower layers 22 – 19, retouch is mainly discontinuous, moderate; and in the later horizons it is mostly continuous and light. On spurs and beaks, the working elements are situated on the lateral sides and the distal margin; the retouch is dorsal or alternate, discontinuous,

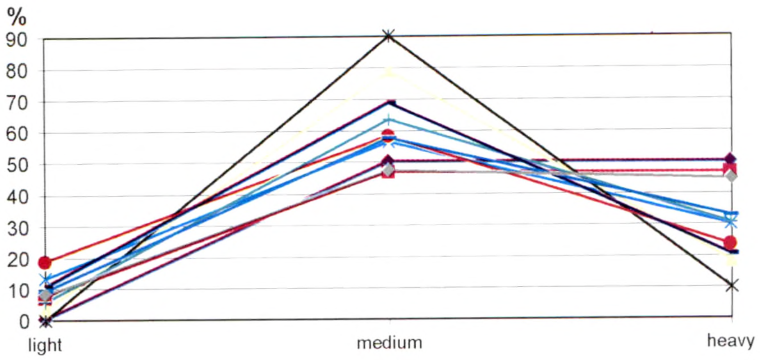

Fig. 22. Distribution of retouch by the degree of modification of the tools' surface, Denisova Cave.

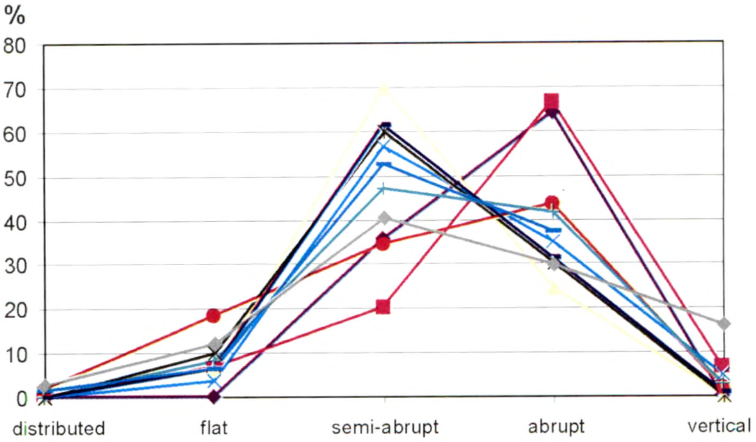

Fig. 23. Distribution of retouch by inclination, Denisova Cave.

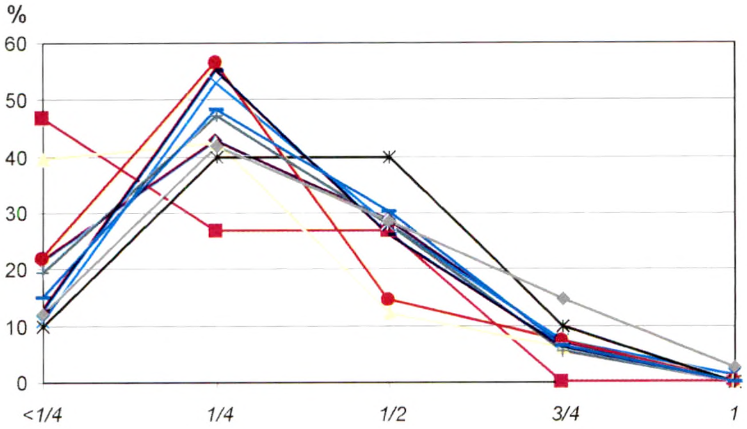

Fig. 24. Distribution of retouch by extent of placement, Denisova Cave.

semi-abrupt, scalar and moderate. The lateral sides of some blades exhibit discontinuous, semi-abrupt, scalar, light retouch occupying up to one half of the tool's perimeter. In flakes, the retouch is dorsal or alternate, discontinuous, semi-abrupt, scalar, and moderate.

The characteristic feature of the Middle Paleolithic industries of Denisova Cave is that not only marginal-dorsal, but also ventral-alternate retouch was widely used. Also, some specific types of retouch, which are uncommon in other industries, were employed. Retouch was mainly continuous, semi-abrupt, scalar, moderate, and covers one quarter of the tools' perimeter. In the early industries at Denisova, retouch was often discontinuous, abrupt, and heavy (Fig. 18 – 24).

Retouching in the Upper Paleolithic industries

Primary reduction in these industries was accomplished primarily through the removal of parallel, occasionally radial, and Levallois spalls. The collection of Upper Paleolithic artifacts from Denisova totals 335 specimens. The categories represented include points, *racloirs*, *grattoirs*, burins, *percoirs*, notched and denticulate tools, *becs* and spurs, retouched blades and flakes, and backed microblades, as well as a shouldered tool and a unique geometric microlith termed an asymmetrical segment (see Fig. 17).

The convergent edges of points are trimmed on their dorsal sides with continuous or discontinuous, semi-abrupt, scalar, moderate retouch. *Racloirs* exhibit retouch on their lateral or distal edges, and such retouch is generally dorsal (less often, ventral), continuous, abrupt or semi-abrupt, scalar, sub-parallel or stepped, and moderate. *Racloirs* were trimmed in various ways, dorsally or ventrally, with continuous, abrupt or vertical, scalar, sub-parallel, parallel or stepped, heavy and moderate retouch, occupying one quarter of the tools' perimeter.

The lateral margins of certain burins display additional continuous, semi-abrupt, scalar retouch occupying no more than one quarter of their perimeter. The tips of points exhibit scalar retouch on their dorsal sides. In notched tools, the lateral or distal sides reveal continuous or discontinuous, semi-abrupt, moderate and heavy retouch. Denticulate working edges are formed with dorsal, continuous, semi-abrupt, scalar, moderate retouch. Spurs and *becs* exhibit dorsal, irregular, abrupt, moderate retouch occupying less than one quarter of the tools' perimeters.

The retouch along the lateral margins of blades is dorsal or alternate, discontinuous, semi-abrupt, scalar, light and moderate, and occupies one quarter to one half of the tools' perimeter. Flakes carry retouch that is dorsal, discontinuous, semi-abrupt, and scalar. Backed microblades and the asymmetrical segment on a dihedral microblades are retouched by the pressure technique on their dorsal sides; the retouch is continuous, vertical and semi-abrupt, parallel, and heavy. The only shouldered tool in the collection bears alternate retouch, which is continuous, abrupt, scalar or stepped, and heavy.

Typically, then, the retouch on Upper Paleolithic tools at Denisova was applied dorsally to the tools' lateral margins, and was mostly continuous, semi-abrupt or abrupt, scalar, but often sub-parallel, parallel and stepped, moderate to heavy, and normally occupies one quarter to one half of the tools' perimeter (see Fig. 18 – 24).

General characteristics of retouching in the Paleolithic industries

The most common type of retouch apparent in Paleolithic industries is scalar. The frequency of sub-parallel, stepped, and, especially, parallel retouch increased with time. In the Denisova Upper Paleolithic industries, stepped and sub-parallel retouch is quite common. In some categories of tools, such as Levallois points, the most intense trimming of working edges is noted in the late Middle Paleolithic (layers 13 and 12). In most notched tools, excluding *encoches*, additional light to moderate retouch is observed. Notched tools from the lower occupation layers at Denisova are more thoroughly retouched than are those from the middle layers. In the upper horizons, heavily retouched tools appear. The retouch on blades is typically scalar and moderate, covering one quarter of the tools' perimeter. In many Upper Paleolithic blades, retouch often covers up to one half of the tool's perimeter.

A peculiar feature of the Paleolithic industries of Denisova Cave is the relatively high frequency of ventral and alternating retouch. Ventral retouch is more common on *racloirs*, denticulate tools, and blades. It is mostly continuous, scalar, and moderate to heavy. Alternating retouching was practiced mainly in the Middle Paleolithic, and was continuous, semi-abrupt, moderate to heavy, and occupied one half of the tools' perimeter.

The general characteristics of retouch in the Paleolithic tools from Denisova Cave are as follows.

Retouch covers mainly the lateral margin, less often the distal part, of tools (see Fig. 19). Dorsal retouch predominates, but ventral trimming is common as well (see Fig. 20). Retouch is mostly continuous (the frequency of discontinuous type gradually decreases in the later horizons, see Fig. 21), semi-abrupt or abrupt (see Fig. 23), scalar (the proportion of parallel and stepped retouch gradually increases, see Fig. 18), moderate (see Fig. 22), and occupies one quarter of the tool's perimeter (see Fig. 24) In terms of type and technique, the retouch on tools from Denisova Cave resembles that of the Ust-Karakol variant

Conclusions

Stratified Paleolithic sites in Gorny Altai are among the most important sources of information concerning the prehistory of North and Central Asia Archaeological finds from Denisova Cave, Kara-Bom and Ust-Karakol-1 make it possible to trace the development of lithic technologies over long periods from the early Middle Paleolithic to the final Upper Paleolithic. The gradual development of lithic industries provides evidence of the continuity of technological traditions during the principal stages of the Paleolithic.

The Middle Paleolithic industries of these key sites reveal technical and typological similarities attesting to their development within a single cultural tradition. However, these industries display specific features that likely reflect economic and technical peculiarities of various types of sites. Thus, in the Middle Paleolithic industries of stratified sites like Kara-Bom and Ust-Karakol-1, primary reduction was usually of the Levallois type, mostly based on blades. The key forms were points and Levallois blades combined with various denticulate and notched forms and Upper Paleolithic tools. The assemblage from Denisova Cave is somewhat different. Primary knapping here was mostly of the parallel and radial types, and tools made on medium and short flakes are common. The most frequent forms are various *racloirs*, and many tools display markedly Levallois traits.

In the early Upper Paleolithic, two independent techno-typological tendencies become evident in the Altai industries (Derevianko, 2001; Derevianko, Shunkov, 2002). The first is related to blade industries and is especially apparent in the Upper Paleolithic horizons of Kara-Bom. Primary knapping in these industries was directed toward obtaining elongated blades from parallel cores. Also, new reduction techniques began to be practiced, based on the production of microblades, including those detached from narrow-faced cores. Most tools, such as end-scrapers, straight dihedral burins, knives with retouched backs, elongated points with flattened bases, and blades with both lateral sides retouched, were made on large blades.

The Upper Paleolithic industries of Ust-Karakol-1 and Denisova Cave developed within a different technological tradition Its distinctive feature is the parallel reduction of simple platform cores. However, a new technique appears. detaching microblades from prismatic, conical and wedge-shaped cores. Distinct forms include various *racloirs* and denticulate-notched forms, but also end-scrapers on blades, carinated end-scrapers on microblades, large elongated blades bearing regular retouch of their lateral sides, and backed microblades.

In addition to the individual peculiarities in techniques of primary knapping and the proportions of various types of tools represented, the two assemblages show appreciable differences in secondary reduction In the Upper Paleolithic industries of Kara-Bom, the principal technique was marginal dorsal retouch that was continuous, semi-abrupt, scalar but sometimes stepped, and light to moderate. The frequency of discontinuous retouch in these industries remained approximately the same, and the proportion of tools with regular retouch increased, whereas that of tools with irregular retouch decreased. Tools with light retouch are relatively numerous. Scalar retouch was always dominant, and the proportion of stepped retouch gradually increased through time. Most commonly, the retouch occupied one quarter of the tools' perimeter, and in only a few instances did it cover a smaller area. Ventral retouch is also present on blades and notched tools. Usually it is irregular or discontinuous, light or moderate.

In the industries from Ust-Karakol-1 and Denisova Cave, mainly the lateral sides and sometimes the distal margins of tools were retouched. The principal variety employed was dorsal, but ventral retouch was rather common as well. It was mostly continuous, semi-abrupt or abrupt, scalar, and moderate, covering one quarter of the tool's perimeter or less. The dominant retouch type was scalar, but some Upper Paleolithic tools exhibit parallel and stepped retouch. Lightly retouched tools are uncommon in these industries, and the proportion of discontinuous retouch decreases through time. Ventral retouch is present on *racloirs* and *grattoirs*, denticulate forms, spurs, *percoirs*, and blades. Ventral retouch is usually continuous, moderate or heavy, and sometimes extends to the distal part of the tool. Alternate retouch was present as well, and it was continuous, semi-abrupt, moderate or heavy, occupying up to one half of the tools' perimeter.

The comparative analysis of secondary reduction techniques in the industries of key Paleolithic sites, then, reveals two variants that largely correspond to the two technological tendencies in the development of Upper Paleolithic culture in Gorny Altai.

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MAJOR STAGES IN THE HUMAN OCCUPATION OF THE WEST SIBERIAN PLAIN DURING THE PALEOLITHIC

Introduction

The West Siberian Plain is one of the largest such topographic features in the world. It forms West Siberia together with mountain ranges of the Altai, the Salair, the Kuznetsk Alatau, and the Solgon. The West Siberian Plain is delimited in its western, southern and eastern margins by the following geomorphic systems: the Ural Mountains, the Kazakhstan hummocky plain, piedmonts of the Altai, the Salair, the Yenisei chain of hills, the Kuznetsk Alatau, and Middle Siberian plateau. The West Siberian Plain is formed mostly of Quaternary deposits. The maximum absolute heights rarely exceed 200 m. Bog landscapes and numerous lakes occupy the central lowland. The basins of the largest Eurasian rivers, the Ob and the Yenisei, are situated on the West Siberian Plain.

The West Siberian Plain has attracted the attention of investigators due to its intermediate geographical position between the Russian Plain, the Ural Mountains, and the montane ranges of South and East Siberia where many Paleolithic sites have been located. Since 1896 when the first Paleolithic site, Tomskaya, was discovered, about 30 Paleolithic localities have been located on the West Siberian Plain (Fig. 1). There is an apparent disproportion in the density of Paleolithic sites located on the West Siberian Plain and contiguous territories, where the number of located Paleolithic sites is considerably greater. The major task of the present paper is to specify the optimal conditions for human occupation of this area during the Paleolithic and to establish the cultural and chronological parameters of Paleolithic industries investigated on the West Siberian Plain.

Optimal conditions for the human occupation of the West Siberian Plain during the Upper Pleistocene

The history of sedimentation and relief formation of the West Siberian Plain during the Upper Pleistocene is discussed in a number of publications (e.g., (Razvitie landshaftov…, 1993; Zykin, Zykina, Orlova, 2000)). Paleolithic studies of the Plain have concentrated on the late Upper Pleistocene (0.13 – 0.01 Ma), thus they are the focus of this paper.

The extent and timing of glaciation on the West Siberian Plain generate considerable debate focusing on the origins, quantity, and size of glaciers as well as on occurrences and development of glacial dam basins. One of the major questions to be resolved is the proposed existence of a glacial dam in the central plain during the Late Zyrian (Sartan) period (cryochron). Some publications provide maps showing the possible limits of this basin (Razvitie landshaftov…, 1993; Arkhipov, Volkova, 1994). Volkov (Volkov, Grosswald, Troitsky, 1978) believed that there were three major glacial basins: the Yeniseyskyi basin in the east, the Purovskyi in the north, and the Mansiyskyi in the central plain, the basin, in which these paleolakes rested, is currently 125 – 130 m above sea level. On the contrary, Astakhov (Razvitie landshaftov…, 1993) argued that during the Late Zyrian, a frozen tundra-steppe with thermokarstic lakes dominated these landscapes and that no continuous ice dam existed, enabling the unimpeded northward flow of associated rivers.

Many researchers doubt the existence of an ice dam in West Siberia in the Late Zyrian period (Laukhin, 1981, 1999; Petrin, 1986; Nikolaev, Petrin, 1996; Leshchinskiy, 2000a). In fact, if Lake Mansiyskoe existed within its

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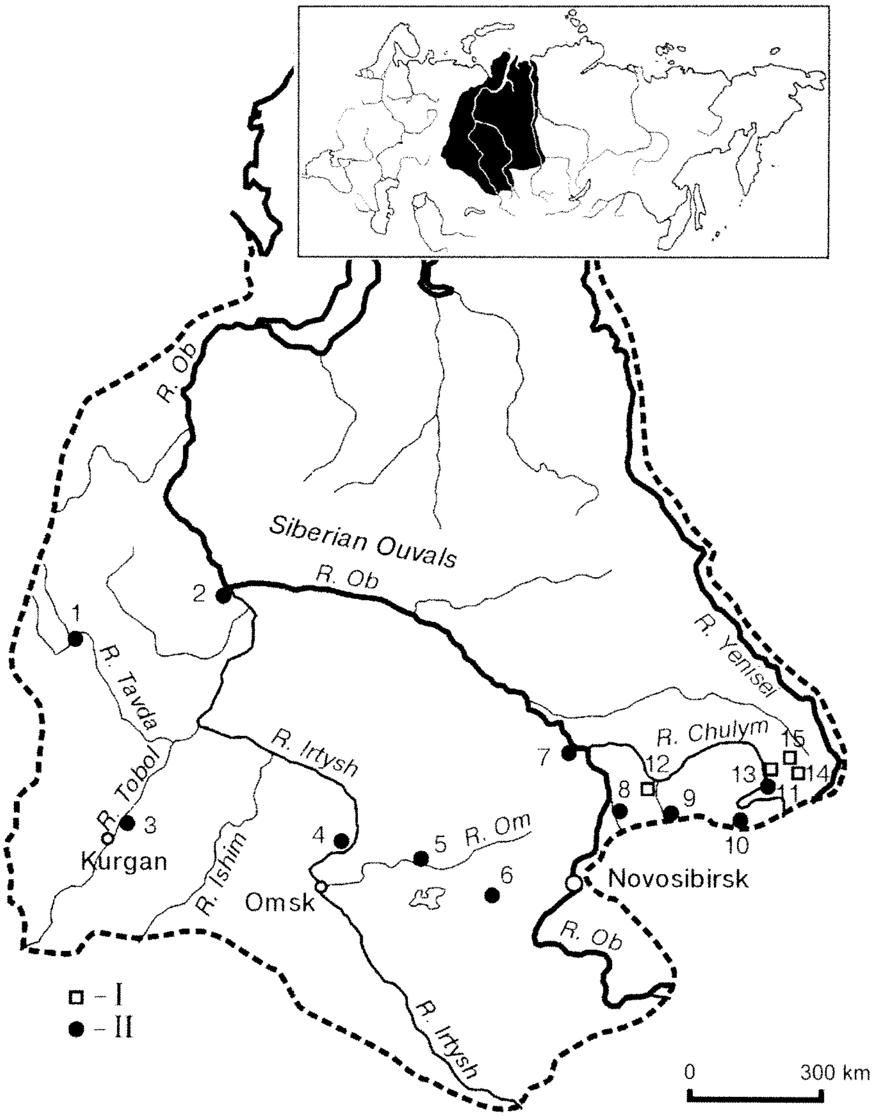

Fig. 1. Map showing the location of major Paleolithic sites on the West Siberian Plain.
I – Pre-Sartan sites, II – Sartan sites
1 – Gari, Rychkovo, Evalga; 2 – Lugovskoe; 3 – Shikaevaka II; 4 – Chernoozerie II; 5 – Novyi Tartas, Vengerovo –5; 6 – Volchia Griva; 7 – Mogochino I; 8 – Tomskaya; 9 – Shestakovo; 10 – Berezovyi Ruchei-1 and 2; 11 – Achinskaya; 12 – Aryshevskoe-1; Voronino-Yaya; 13 – Bolshoi Ului, Ust-Bolshoi Ului; 14 – Bolshoi Kemchug; 5 – Nekrasovskoe.

projected boundaries (Volkov, Orlova, 2000), it would have prevented large mammals and humans from penetrating into the territory in question. Such a reconstruction contradicts the available data on human habitation of areas with absolute elevations of 20 – 110 m, which is supported by radiocarbon dates in the range of 14 – 19 ka. Paleolithic materials found *in situ* in association with mammoth bones and skeletal remains of other animals at the 75 m level (e.g., the Shikaevka II, Chernoozerie II, and Gari sites) and 20 – 25 m level (the Lugovskoe site) produced ^{14}C dates in the range of 18 – 14 ka providing support for the habitation hypothesis.

Studies of human habitation of the West Siberian Plain in the Paleolithic inevitably imply analyses of the ways in which the process of occupation of new lands depended on the geological structure of the territory. Such an approach considers this objective factor influencing humans and animals. The process of occupation of new lands was regulated by existing climatic conditions, food resources, and raw material availability. These factors are related to each other and are reflected in the geological history of the later Pleistocene. The geological structure, relief, and macroclimate stipulated development and zoning of the faunal communities, which, in turn, had direct impacts on the diversity of fauna and caused migration of large mammals. During the Pleistocene, the vital functions of ungulates depended on specific geochemical landscapes with unique "mineral oases" of alkaline soils, the so-called "animal solonetz" (Leshchinskiy, 2001).

An optimal combination of specific factors might have served as an objective stimulus for occupying vast territories of North Asia in the Paleolithic, while an imbalance might have been a delimiting factor. The West Siberian Plain may serve as an example illustrating such a supposition.

Geo-chemical landscapes as a factor in determining human habitation of the West Siberian Plain in the Paleolithic

The region under study represented zones bordering glaciers, which were characterized by extreme climatic fluctuations. Landscapes frequently changed from tundra to steppe ecosystems and vice versa (Leshchinskiy, 2000a), with short intervening phases of forest expansion (Krivonogov, 1988; Volkov, Orlova, 2000). The proposed model is supported by the remains of large animals recovered from sites of natural accumulation of animal bones and skeletons (Leshchinskiy, 2000b; Leshchinskiy et al., 2001; etc.), and from archaeological sites. Agadjanian (2001: 467) pointed out that mammoth, bison, and horse are most characteristic of Paleolithic sites in West Siberia, while woolly rhinoceros remains are scarce. Moose, reindeer, and saiga bones are uncommon. We may infer that the Late Pleistocene fauna was more homogenous in the Plain, than in the mountainous regions of South Siberia.

Many Paleolithic sites located in the Plain have produced mammoth bones; in some cases, mammoth bones dominate relevant faunal collections. Accumulations of mammoth bones were found at the sites of Volchia Griva and Shestakovo where the share of mammoth remains reaches 90% of the bone collections assembled. Taphonomic analysis and direct radiocarbon dating of paleozoological materials suggests a long period of bone accumulation down to 7 ka. The predominance of mammoths among those animal species related to human subsistence forces us to pay attention to the ecology of this species. Numerous reconstructions and hypotheses concerning the formation of taphocenoses at Volchia Griva (Okladnikov et al., 1971; Alekseyeva, Volkov, 1969) are debatable (Abramova, 1989) and have not been supported by recent investigations at the site (Orlova et al , 2000; Mashchenko, Leshchinskiy, 2001). Multidisciplinary investigations at Shestakovo and Volchia Griva allow us to infer that animal bones were accumulated at sites of concentrated alkaline soils, the solonetz (Mashchenko, 1999; Leshchinskiy, 1999; Derevianko et al., 2000; Mashchenko, Leshchinskiy, 2001; Leshchinskiy, 2001). This inference is supported by the results of geological, taphonomic, and archaeological research. The interdisciplinary approach to the study of these sites necessitated our consideration of the phenomenon of lithophagia (see (Bgatov, 1993; Panichev, 1990)), common for Pleistocene herbivorous animals.

It is proposed that lithophagous animals visited areas with high concentrations of ion-exchange and sorbent substances. Natural alkaline soils usually do not contain sodium chloride. Inclusion of mineral agents in the diet can be explained by the necessity to regulate the water-salt balance of the organism (Bgatov, 1993). Alkaline soils of West Siberia are formed of montmorillonite and bentonite, and only rarely of hydromica and kaolin clay. Visits to solonetz areas are seasonal (spring and fall) and coincide with periods of fertility, calving, and the change of diet. Calcium, Magnesium, and Sodium are the most necessary macro-elements in the diet of animals. Deficiencies in these elements lead to ecological stress, disease, and even to death (Panichev, 1990) Mineral deficiencies are most typical of the inhabitants of areas characterized by acidic soils (e g., tundra and taiga). Tundra zones developed under permafrost conditions during the later Pleistocene which might have caused repeated episodes of mineral deficiency among herbivorous animals, especially the mammoth (Derevianko et al., 2000). Leshchinskiy (2000a· 20) believes that seasonal migrations of herbivorous mammals necessarily led to "mineral oases". Tens and even thousands of animals likely gathered at these sites during periods of maximum mineral deficiency. A high mortality rate and conditions of deposition of carcasses at certain sites might have led to the formation of thick bone-bearing horizons. Shestakovo and Volchia Griva may be taken as examples of such sites.

Specific features noted in the collection of faunal remains from Shestakovo suggest spring as the most probable time of their death (Derevianko et al., 2000). A series of twenty ^{14}C dates ranging from 18 – 25.5 ka demarcates a long period during which accumulation of mammoth bones occurred at this multilayered site. A solonetz of analogous lithic composition (i.e., early Cretaceous montmorillonite clay) has been found 30 km from Shestakovo, supporting our hypothesis on the existence of solonetz in this area in the past. Lithologic-geochemical and taphonomic analyses, as well as the composition and the morphology of mammoth remains at Volchia Griva, revealed their similarity to evidence recovered at Shestakovo. Geochemical features characterizing the Volchia Griva sediments allow their attribution to alkaline soils of the calcium-natrium type. Analyses of paleo-zoological remains recovered from this site testify to conditions conducive to the preservation of fossils and only minor post-mortem transportation (Mashenko, Leshchinskiy, 2001). A series of ^{14}C dates in the range of 17.9 to 11 ka suggests a long period of the formation of the death assemblage. Similar features identified among faunal remains recovered from Volchia Griva and Shestakovo supports our hypothesis that sites of mass deposition of mammoths in southern West Siberia are linked with sites with exposures of vitally necessary minerals. It is likely that the specific ecology of the mammoth and its vulnerability under conditions of mineral deficiency caused formation of such specific "mammoth cemeteries" at solonetz sites during the late Upper Pleistocene

The dependence on herbivorous animals forced human ancestors to follow mammoth migration routes to Ca – Na – Mg geochemical landscapes (Leshchinskiy, 2000a). (Certain researchers such as Germonpre (1993) think that mammoth migrations were in the range of 650 to 2,500 km). Short-term occupation sites like Shikaevka II and Tomskaya support our suppositions regarding such migrations. Stable migration routes passed through "mineral oases", encouraging human populations to return to sites that had been previously inhabited. This may be the reason for the noted multilayered cultural deposits at Shestakovo, which represent an area hardly appropriate for permanent habitation.

Lithic resources

Availability of lithic raw material is determined by the geological structure of the area. On the West Siberian Plain, raw material was not always available everywhere for human exploitation. The Siberian Hills and areas along the western boundary of the Plain are rich in raw material and the scarcity of Paleolithic sites can hardly be explained in terms of raw material deficiency. The basins of the Tobol, the Ishim, and the Irtysh, located south of Siberian Hills, do not contain rock exposures and pebble concentrations resulting in a paucity of lithic resources (Laukhin, 1999). This factor probably explains the small number of Paleolithic sites located in the central and southern West Siberian Plain. The raw material of tools recovered from investigated sites has been identified as originating in the Ural Mountains and North Kazakhstan (Petrin, 1986; Okladnikov, Molodin, 1983). This fact suggests that early foragers were able to transport lithic materials over hundreds of kilometers. Paleolithic sites that have been located thus far in the Irtysh Basin (including its plain area) are attributed to the Sartan period. Environmental conditions at the time were probably favorable for early humans to make journeys of many kilometers bearing lithic raw material and tools.

The territory situated between the Ob and the Yenisei rivers is deficient in high quality lithic raw material. The scarcity of Paleolithic sites located in the eastern Tomsk region of the Ob basin may be explained as a result of insufficient investigation of that territory. However, recently several Stone Age sites have been located in this territory, including those attributed to the pre-Sartan period. Lithic tools recovered from these sites were made mostly on quartzite-like sandstone obtained from rocky outcrops (Zenin, Leshchinskiy, 2001). It is noteworthy that lithic tools associated with the earliest Paleolithic site in Siberia, Mokhovo-1 in the Kuznetsk Depression (Nikolaiev, Markin, 1990), were made on similar rock types.

Bolshoi Kemchug (Vdovin, 1992; Zenin et al., 2000; Zenin, Konovalenko, 2001) is the easternmost site located on the Plain. This site yielded Stone Age artifacts dating from the Middle Paleolithic to the Mesolithic. Earlier industries were made exclusively on materials derived from Jurassic bedrock outcrops: lenses of flint, siliceous siderite, and aleurolite. The later industries include also artifacts made on pebbles.

Sites attributed to the pre-Sartan period

As was stated above, the most ancient sites on the Plain (presumably Middle Paleolithic) are located adjacent to bedrock outcrops. The Chulym Basin has yielded both stratified sites (e.g., Voronino-Yaya and Aryshevskoe-1 and 2) and localities with only surface occurrences of artifacts (e.g., Bolshoi Ului and Ust-Bolshoi Ului) (Zenin, Leshchinckiy, 1998a, b). Large and medium-sized cores, tools, and massive spalls characterize these industries.

The Aryshevskoe-1 workshop yielded the most complete collection of artifacts among the sites mentioned above. Primary reduction strategy is based on radial, orthogonal, convergent, and parallel patterns of flaking. The tool kit is mostly characterized by *racloirs*, denticulates, and notched implements. Late Paleolithic types are scarce or absent. These collections also include implements bearing scars of burin spall removals and various protrusions fashioned through notching, retouch, and hewing. Tools were fashioned mostly on flakes. Blades are scarce; most do not show signs of secondary working. The presence of subtriangular flakes in the collection is noteworthy. The age of this industry has not been determined yet, however a number of ^{14}C dates (SOAN-4178, SOAN-4179) were generated on humic acids derived from the buried soil of the lower culture-bearing layer and suggest an age for this layer older than 40 ka. One more date of 33,630 ± 995 BP (SOAN-4180) was obtained on charcoal recovered from the upper culture-bearing layer, however, the sample may be contaminated with younger charcoal from overlying sediments.

The Voronino-Yaya site yielded archaeological materials which are chronologically close to the Aryshevskoe-1 artifacts. The Voronino-Yaya collection

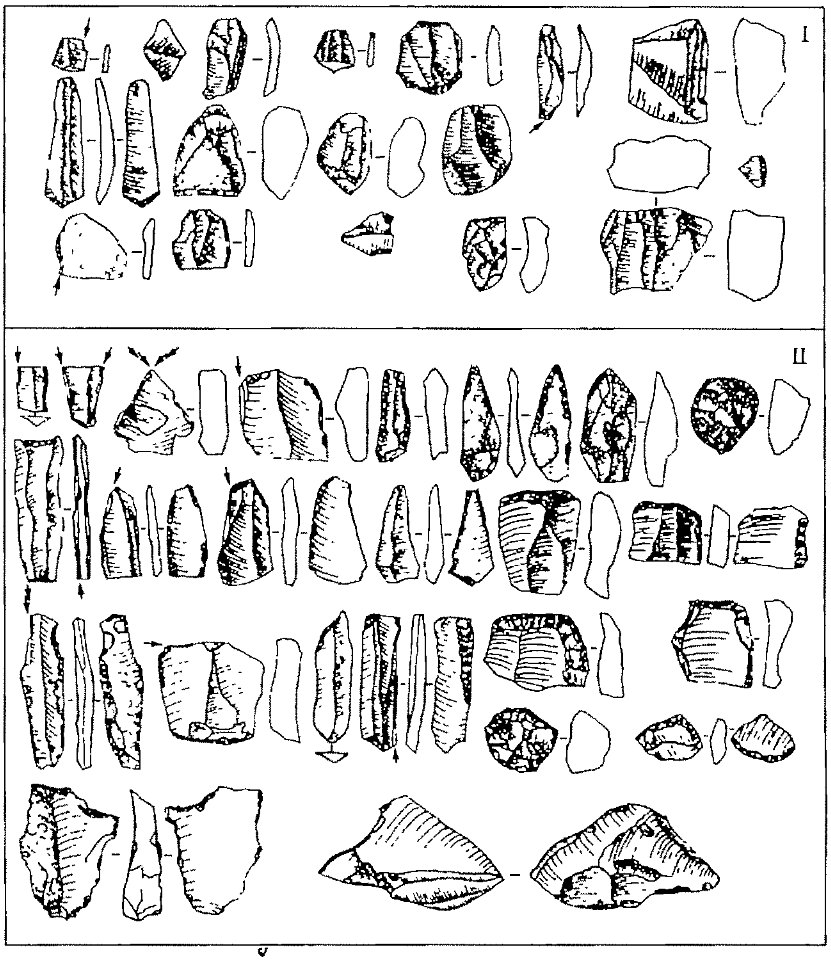

Fig 2. Lithic artifacts from Gari (I) and Chernoozerie (II) (after (Serikov, 2000; Petrin, 1986)).

comprises few implements of quartzite sandstone in association with bone fragments of elk, woolly rhinoceros, and ground squirrel (*Spermophilus undulatus* Pall). The conditions of deposition and the state of preservation of the remains suggest their attribution to the Late Pleistocene. One ^{14}C date of 28,450 ± 850 BP (SOAN-3837) was generated on bone from overlying sediments.

The Bolshoi Kemchug site yielded artifacts that have been grouped according to the state of surface abrasion into series of medium, lightly abraded, and unabraded specimens. In addition, some artifacts exhibit medium surface abrasion and a few lightly abraded implements demonstrate deep patination. Certain artifacts bear scars of detachments dating from different periods. The specific raw material used (siliceous siderite) allows us to infer that it was transported to the north and southwest over distances up to 220 km from the source. This pattern mostly concerns artifacts recovered from a Neolithic hoard in the vicinity of Shestakovo on the Kiya River as well as archaeological materials from the Nekrasovskoe site on the Bolshoi Kemchug (Zenin et al., 2000).

Investigations at the above-named sites are still ongoing, preventing us from offering final interpretations of the available data. Currently, we are not able to propose any direct links between these industries and later technocomplexes. Still, the available data seem important since they suggest the presence of a considerably earlier human population on the West Siberian Plain than was previously thought.

Sites attributed to the Sartan period

Most of the known Paleolithic sites of the West Siberian Plain have been attributed to the Sartan cryochron of the late Upper Pleistocene. Here we provide only brief descriptions of the principal sites of this stage.

Lugovskoe. This site was investigated by Pavlov and Mashchenko (2001) initially as an accumulation of remains of Pleistocene mammals. It is located in the vicinity of Lugovskoe, 30 km west of Khanty-Mansiysk (~ N 61°04', E 68°34', absolute elevation ~ 20 – 25 m). A ridge containing bone-bearing layers is dissected by a

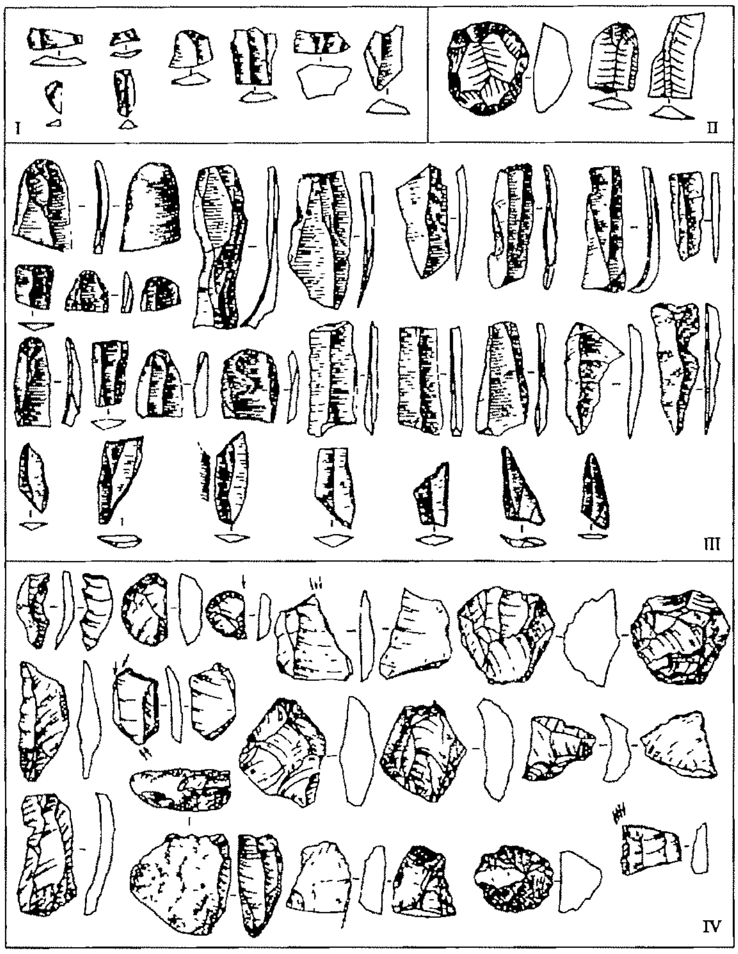

Fig 3. Lithic artifacts from Novyi Tartas (I), Vengerovo-5 (II), Shikaevka II (III), Troitskaya I (IV)

spring exposing ancient bones. The collection comprises more than 3,000 bones of large animals including mammoth, woolly rhinoceros, horse, bison, reindeer, and wolf. Mammoth bones constitute more than 90% of the collection. A few flakes and an irregular blade with a truncated proximal end were found in association with the faunal elements. A ^{14}C date of 18,250 ± 1100 BP (SOAN-3838) was generated on a mammoth bone fragment (Orlova, Kuzmin, Dementiev, in press).

Gari. This site is located on the right bank of the Sosva River in the vicinity of Gari Station in the eastern Sverdlovsk Administrative District (~N 59°25', E 62°23', absolute elevation ~ 75 m). The site yielded 348 lithic artifacts and animal bones bearing use-wear signs and probably represents a short-term occupation camp near a natural animal "cemetery". The faunal collection is dominated by mammoth remains and also includes bones of woolly rhinoceros, bear(?), horse, and saiga. Lithic implements are mostly made on South Uralian jasper (65%). The collection of lithic artifacts includes parallel cores, flakes, retouched blades, scrapers, and implements fashioned with the aid of burin spall removals (Fig. 2, I). The Gari industry is best classified as blade-based (up to 70% of the recovered spalls are true blades). Two dates have been generated on bone: 15,150 ± 280 BP (SOAN-4462) and 16,320 ± 450 BP (SOAN-4461). Several other sites yielding accumulations of bone with associated lithic implements have been located in this area: Gari II, Rychkovo, and Evalga (Serikov, 2000). Two ^{14}C dates have been generated on mammoth bones: 17,810 ± 320 BP (SOAN-4463) for Rychkovo and 19,710 ± 205 BP (SOAN-4464) for Evalga (Orlova, Kuzmin, Dementiev, in press).

Shikaevka II. This site is located on the right bank of the Tobol valley (~N 56°00', E 65°55', absolute elevation ~ 75 m). The faunal collection includes two nearly complete mammoth skeletons as well as solitary bones of wolf, saiga, reindeer(?), and hare. The collection of lithic artifacts includes 35 implements made of Uralian jasper including tools fashioned on blades and blades bearing use-wear signs (Fig. 3, III). The site is classified as a short-term occupation camp where mammoth

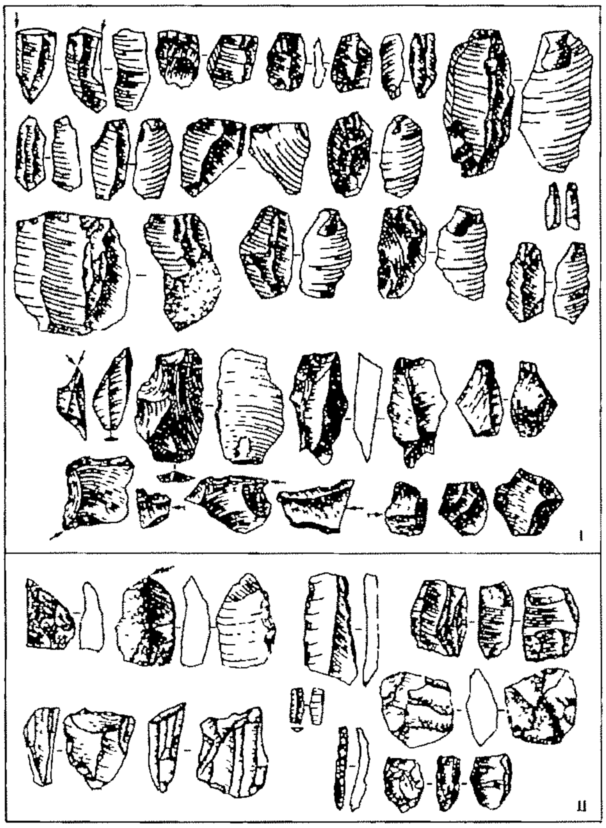

Fig. 4. Lithics artifacts from Tomskaya (I) and Mogochino I (II) (after N.F Kashchenko, Z A. Abramova, V I Matiushenko, V.N. Zenin, and V T. Petrin).

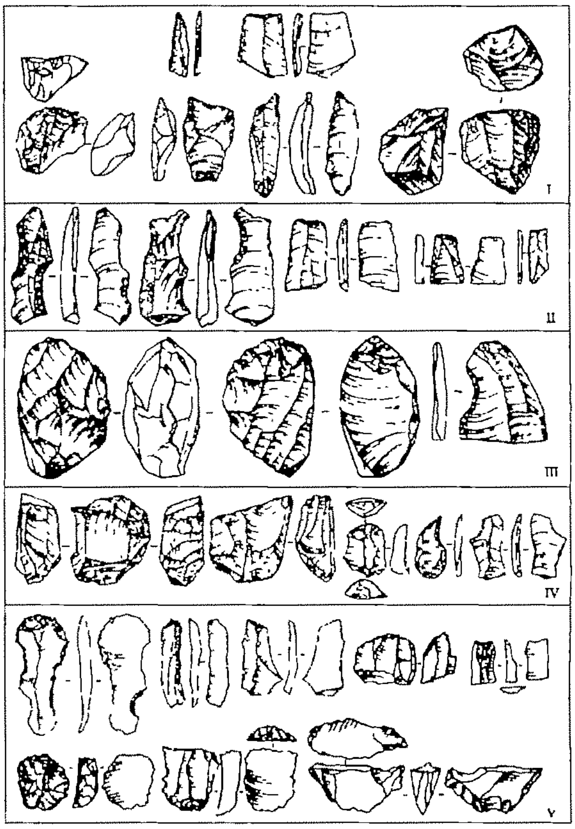

Fig. 5. Lithic artifacts from Listvenka (I), Volchikha (II), Malyi Izhul III (III), Ust-Izhul II (IV), and Achinskaya (V) (after V.N. Zenin, E V. Akimova, and V.E. Larichev).

carcasses were butchered (Petrin, 1986). Stratigraphic data and palynological analyses allow age estimates of the culture-bearing layers in the range of 13 – 11 ka (Tseitlin, 1979). A^{14}C date of 18,050 ± 95 BP (SOAN-2211) has been generated on mammoth bone.

Novyi Tartas and Vengerovo-5. These sites are located on the second(?) terrace of the right bank of the Tartas River (~N 55°40', E 76°42'). The ridged surface of the terrace (absolute elevation ~ 100 m) is typical of the topography of the Baraba Plain situated on the southern West Siberian Plain. Paleozoological finds and few lithic artifacts (Fig. 3, I, II) were recovered from such contexts. The lithic materials suggest a blade-based industry. The Sartan age of these sites is proposed on the basis of available faunal remains and the noted similarity of the artifacts with materials from the Chernoozerie II and Volchia Griva sites (Okladnikov, Molodin, 1983).

Chernoozerie II. This site is located on the left bank terrace of the Irtysh River (~N 55°45', E 73°57'). The surface of the terrace (~ 11 – 12 m above the water level, absolute elevation ~ 80 m) is composed of dunes 1 – 2 m high. One of these dunes contained three cultural horizons attributable to the Paleolithic (Gening, Petrin, 1985) Excavations at the site revealed remains of living and other activity zones. The faunal collection contains bones of elk, bison (predominating), horse, saiga, beaver, fox, wolverine, and hare. The rodent microfauna includes pika, lemming, and field vole. Remains of birds and fish were also identified. Available evidence suggests the use of bone for fuel. The lithic collection totals 3,000 specimens and includes prismatic cores, blades and blade fragments, flakes, and various types of tools. The following diagnostic categories were identified: blades with retouched margins, lithic components of composite tools from 3 to 6 mm wide, burins, and carinated end-scrapers (see Fig. 2, II). Few pebble tools were recovered, while side-scrapers were not noted at all. The tools were mostly made of siliceous, japer-like rocks and quartzite. The bone tool collection comprises 34 specimens, mostly composite daggers and knives, adornments, and figurine fragments. Many implements bear ornamentation patterns. Tseitlin dated the culture-bearing horizons at Chernoozerie II to the Late Sartan warm oscillation (12.0 – 10.8 ka) on the basis of depositional features. He thinks that a date of 14,500 ± 500 BP (GIN-622) generated on a charcoal sample from the second culture-bearing horizon is too early (Tsetlin, 1979).

Fig. 6. Exposed sediments in the vicinity of Shestakovo.

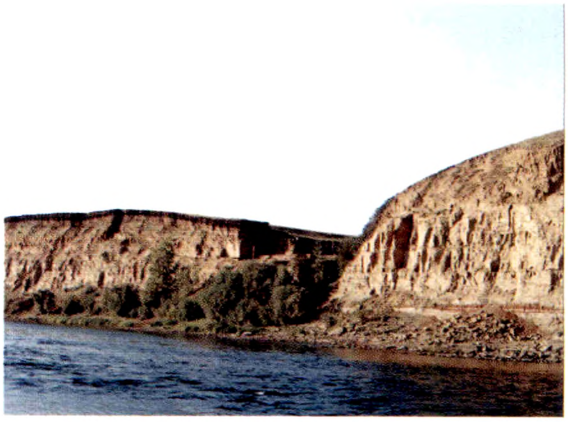

Fig. 7. The Shestakovo site, located at the valley mouth.

Mogochino I. This site is located on the left bank of the Ob River, 17 km downstream from the Chulym River (~N 57°40', E 83°35', absolute elevation ~ 70 – 80 m). Landslides are a major feature of the local topography. The faunal collection includes remains of mammoth, horse, reindeer, woolly rhinoceros, bison, fox, and polar fox. Excavations at the site yielded a collection of 1,348 lithic implements (Fig. 4, II). The collection of cores includes discoidal, flat, and narrow-face varieties including micro-cores reminiscent of wedge-shape types. Tools were classified into categories of side-scraper-like tools on shatter and flakes, end-scrapers, and chisel-like tools. Also, few burins and blades were identified. Petrin (1986) asserts that the Mogochino archaeological materials resemble the Afontova Culture of the Yenisei. On the basis of this similarity, Mogochino was dated to 17 – 16 ka ago, which is in contradiction to the presence of rhinoceros bones in the collection and one available date of 20,150 ± 240 BP (SOAN-1513) generated on mammoth bone.

Tomskaya. This site was discovered in 1896 by N.F. Kashchenko, a professor of zoology at Tomsk University. The site is located in Tomsk City on the right bank of the Tom River (~N 56°27', E 84°59', absolute elevation ~ 110 – 115 m). Originally the site was elevated 40 – 42 m above water level but the site itself was destroyed by landslides. The site yielded bones belonging to one mammoth in association with about 200 lithic artifacts from a level 3.5 m below the surface (Kashchenko, 1901). The artifacts were recovered from a layer of loessic loam overlying sand and pebbles. The ancient surface with bones shows signs of burning and concentrations of charcoal and burned bones. Abramova and Matushchenko (1973) described the collection of 140 artifacts. In 2000, the collection includes 101 lithic tools and one side-scraper-like implement fashioned on a flake detached from a tubular bone. The presence of a series of blades retouched along their margins, blade fragments, and a core of parallel reduction pattern (Fig. 4, I) suggests attribution of the whole collection to the blade-based type. The collection also comprises implements bearing signs of burin spall detachments, chisel-like tools, implements bearing retouched notches, and flakes with fine marginal retouch. This collection has many features in common with the Shestakovo industries, especially in terms of raw material, the predominant sizes of tools, and major tool categories. An associated date of 18,300 ± 1000 BP (GIN-2100) has been generated on charcoal.

Achinskaya. This site is located 2 km east of Achinsk City (~N 56°16', E 90°29', absolute elevation ~ 270 m). The site was discovered in 1960 by Avramenko, a geologist, who carried out investigations in 1963 – 1964 with Matushchenko. In 1972 the site was studied by Larichev (Avramenko, 1963; Larichev, Arustamian, 1987; Anikovich, 1976). A culture-bearing horizon 2 to 12 cm thick was identified at the site in association with hearths containing bone ash and fragments of brown coal. This horizon yielded bones of mammoth, horse, saiga, wolf, polar fox, and various birds.

The tool kit (Fig. 5, V) identified at this site includes single and double platform cores, as well as discoidal, conical, and narrow-face nuclei varieties. A few multiplatform cores were also noted. Certain cores, from which flakes were removed from their narrow face, reveal features similar to wedge-shaped nuclei. The considerable exhaustion of cores represents the principal characteristic feature of this industry. Tools are mostly fashioned on blades. Numerous denticulate tools and implements with retouched notches were identified. The *grattoirs* include a variety of types, the most numerous being double and carinated end-scrapers. Also side-scrapers, chisel-like tools, bifacially worked tools, tools with spurs, and implements bearing scars of burin spall detachments were identified. In general, the Achinskaya tools are larger than those from Shestakovo. Bone artifacts were also noted: fragments with deep cut marks

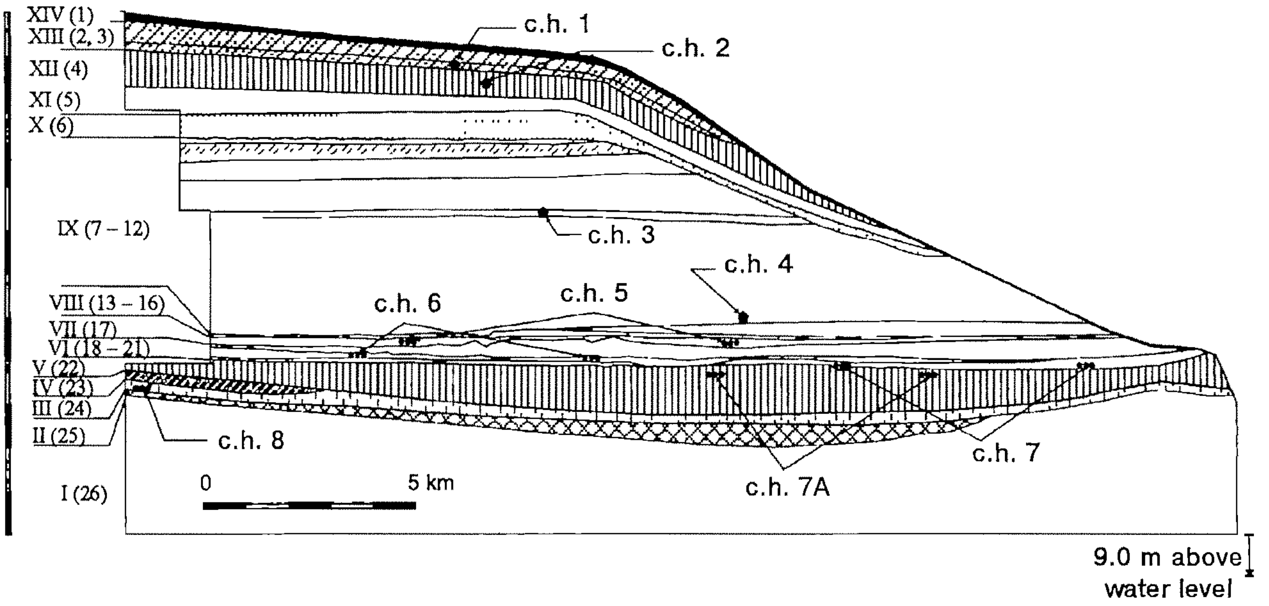

Fig 8. Shestakovo stratigraphic profile of later Pleistocene deposits; culture-bearing horizons (c.h.) are specified.

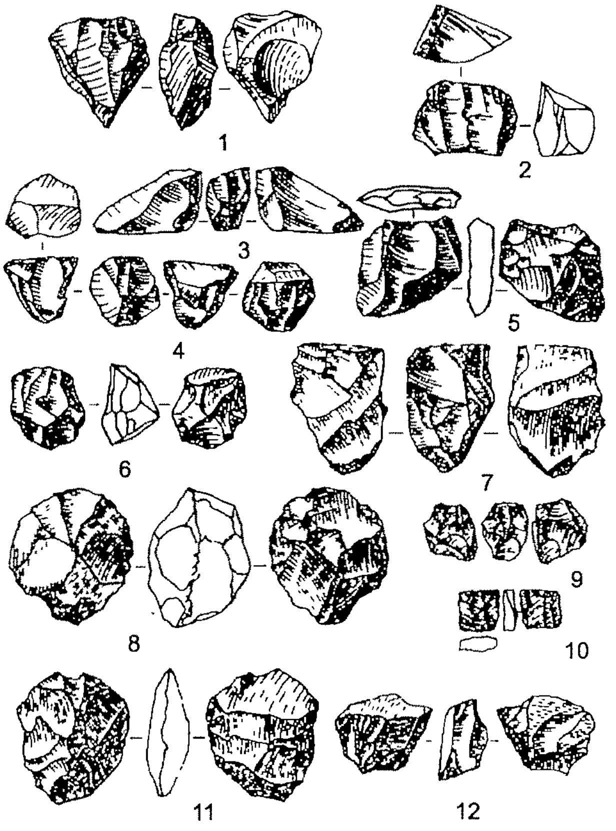

Fig 9 Lithic artifacts from Shestakovo.
1 – from culture-bearing horizon 8, *2, 9, 10* – from horizons 7 and 7A, *3 – 8, 11* – from horizon 6, *12* – from horizon 5.

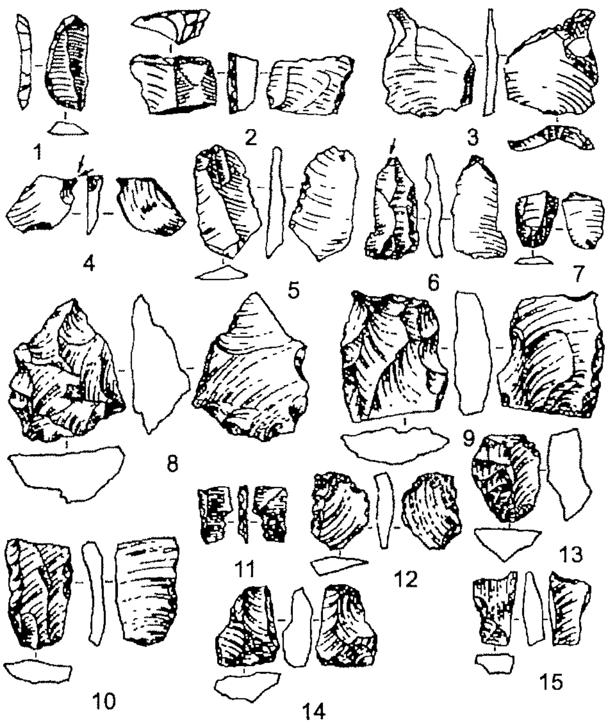

Fig. 10 Lithic artifacts from Shestakovo culture-bearing horizons 8 (*1*), 7 and 7A (*2 – 15*)

and a baton with a dotted ornamentation pattern The exact age of the Achinskaya site has not been established, however the majority of researchers estimate the age of this site as early Sartan (Abramova, 1989; Vasiliev, 1996; Lisitsyn, 2000).

Shestakovo. This site is located on the southeastern West Siberian Plain (N 55°54' 30.8", E 87°57' 07 0") on a high bank of the Kiya River (the left tributary of the Chulym). The high bank is formed of chalk sediment The later Upper Pleistocene loessic loam sediments lie non-conformably over the chalk (Fig. 6). The steep riverbank exposes sediments bisected by a small flat-bottomed hollow (Fig. 7). A cross-section of the total area of 680 sq. m was established on the right bank of the hollow. The Shestakovo stratigraphic column contained 25 stratigraphic layers representing 13 stratigraphic units of Upper Pleistocene and Holocene sediments (Derevianko et al., 2000). A rich collection of mammoth bones was recovered from the lower portion of the profile where culture-bearing horizons of the early Sartan period were established (Fig. 8).

Culture-bearing horizon 8 was established within the loess sediments of stratigraphic layer 24. Two ^{14}C dates have been generated for this layer: 24,590 ± 110 BP (GrA-13239) on a horse bone, and 25,660 ± 200 BP (GrA-13238) on a mammoth bone. Two artifacts were recovered in association with this horizon: a single platform core with one flaking surface (Fig. 9, *1*) and a dihedral backed blade (Fig. 10, *1*).

Culture-bearing horizon 7A was established within the loess sediments included in stratigraphic layer 22. Several ^{14}C dates have been generated on mammoth bones: 22,240 ± 185 BP (SOAN-3612); 22,290 ± 125 BP (SOAN-1380); 22,500 ± 280 BP (SOAN-4177); 22,750 ± 160 BP (GrA-15880); 22,990 ± 170 BP (SOAN-1386); and 23,330 ± 110 BP (GrA-13235). The uppermost portion of this layer was washed out and redeposited as alluvial coarse-grained sediments in the micro-relief depressions (stratigraphic layer 21) of the section. A date of 21,300 ± 420 BP (SOAN-3611) has been generated on a mammoth bone recovered from this layer. Archaeological materials recovered from this stratigraphic layer are associated with ***culture-bearing horizon 7*** The overall collection of culture-bearing horizons 7 and 7A totals 233 specimens including chips and small flakes (n = 70).

A series of core-like implements (n = 8) includes true nuclei as well as core-like fragments. Within the series of cores (n = 5), a blade core with one flaking surface (Fig. 9, *2*), a flat, double platform core with two flaking surfaces (Fig. 9, *10*), a multiplatform core exhibiting radial and orthogonal flaking patterns (Fig. 9, *9*), and nuclei from which flaking was executed from their narrow faces, have been identified One narrow-face core is noteworthy: it is reminiscent of wedge-shaped varieties and bears signs of abrupt retouch on its keel. An analogous method of narrow-face core reduction, the morphology of which is similar to wedge-shaped varieties, is found in early Upper Paleolithic technocomplexes of the Altai (Fig. 11, IV) (Derevianko, Shunkov, 2002: fig. 11, *4*, *5*). The spalls include flakes (n = 55) as well as technical (n = 9) and laminar (n = 37) spalls. On average, the size of flakes and blades is 40 mm and the width of laminar spalls is 16 mm. A few small blades and bladelets have been also identified.

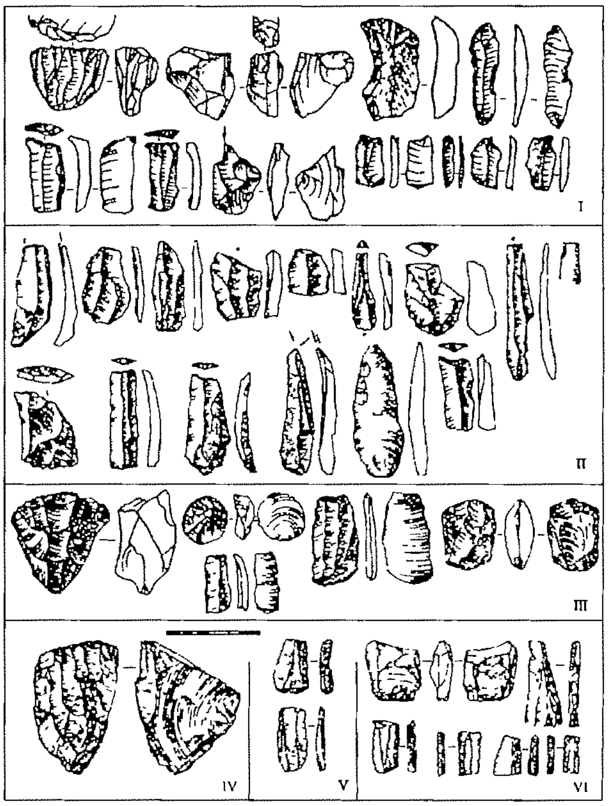

Fig. 11 Lithic artifacts from Talitski (I), Postnikov Ovrag (II), Malta (III), Ust-Karakol-1 (IV), Anui-2 (V), Denisova Cave(VI)

The tool kit totals 54 artifacts (23%). The size of the tools does not exceed 40 mm. Various spur-bearing implements form the most numerous category (n = 21). The common feature of tools included in this category is the presence of a protrusion or angle intentionally trimmed with the aid of various technical methods (retouch, notching, truncation, burin spall detachment, hewing) (Fig. 10, *3*, *6*, *9*). The *grattoirs* include two carinated end-scrapers (Fig 10, *2*) and one lateral *grattoir* (Fig. 10, *13*). The burins are represented by two angle specimens (Fig. 10, *4*). Notches (n = 6) exhibit concave edges with continuous retouch (Fig. 10, *11*, *15*). The cutting edges of denticulate tools (n = 5) were formed with multi-faceted irregular retouch (Fig. 10, *8*, *12*). Retouched

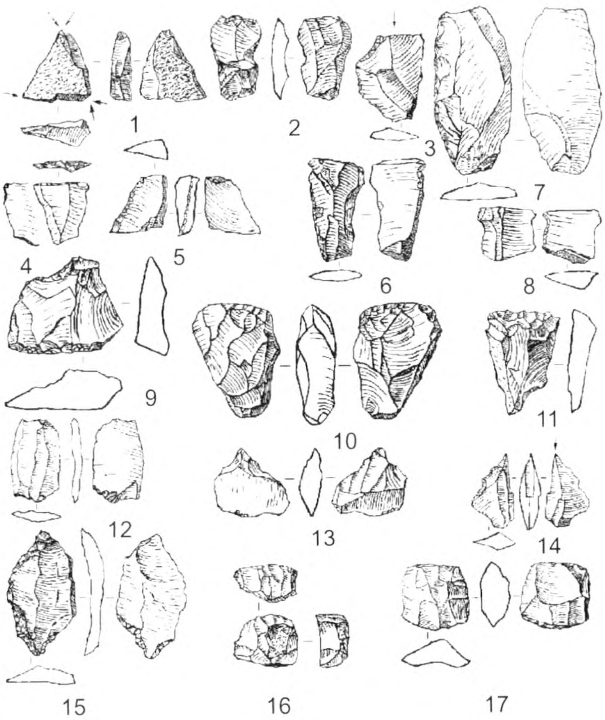

Fig. 12. Lithic artifacts from Shestakovo culture-bearing horizon 6.

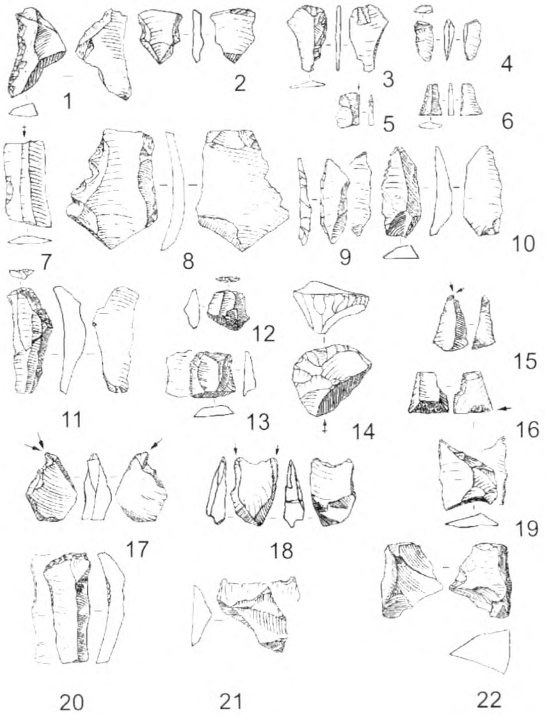

Fig. 13. Lithic artifacts from Shestakovo culture-bearing horizon 6.

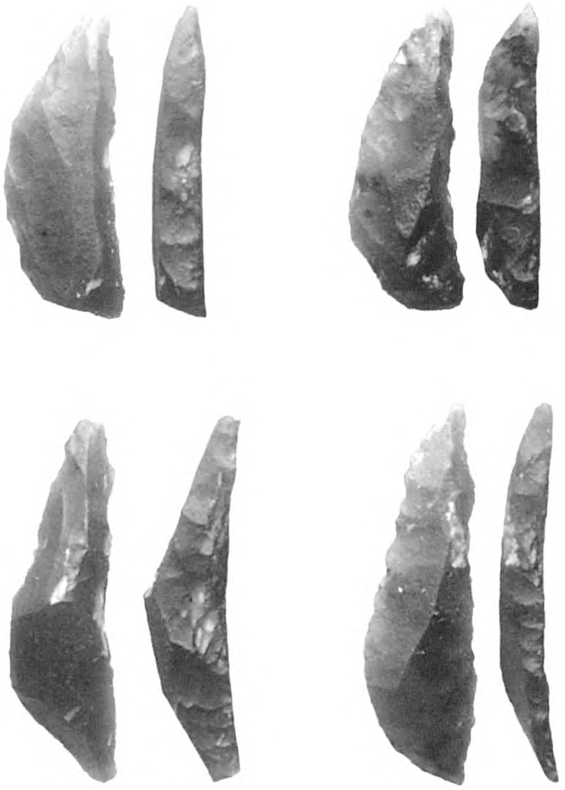

Fig. 14. Segment micropoints from Shestakovo culture-bearing horizon 6.

blades (n = 8) were treated with various types of retouch: fine marginal retouch on the dorsal (Fig. 10, *7*) and ventral faces, serration on the ventral face (Fig. 10, *5*), and alternating retouch (Fig. 10, *10*). Retouched flakes (n = 5) were formed with fine marginal and two-stepped varieties of retouch and serration. A single chisel-like tool was fashioned with bifacial reduction of the cutting edge (Fig. 10, *14*). Pebble tools (n = 3) were identified as hammerstones. In general, more than 30% of the tools were fashioned on laminar blanks.

Culture-bearing horizon 6 was identified within the loess sediments of stratigraphic layer 19. A series of ^{14}C dates is available for this layer: 20,360 ± 210 BP (SOAN-3608) on reindeer and horse bones; 20,480 ± 180 BP (SOAN-3607) and, 22,340 ± 170/180 BP (GrA-13240) on mammoth bones; 20,770 ± 560 BP (SOAN-3218) and 24,360 ± 150 BP (GrA-10935) on burned bones; and 20,800 ± 450 BP (SOAN-3618), 23,250 ± 110 BP (GrA-13233) and 23,290 ± 200 BP (AA-35322) on charcoal.

The total collection of lithic artifacts comprises 2,718 specimens including chips and scales (n = 1,449). The set of core-like implements (n = 103) includes nuclei and core fragments. A total of 44 cores has been identified. The sizes of these cores do not exceed 50 mm. Exhausted cores used for the production of small flakes and blades dominate. Single platform cores are also numerous. Small blades were detached from wide surfaces of such cores (Fig. 9, *6*). A core bearing scars of flat removals on the back surface resulting from a previous reduction stage

(Fig. 9, *5*) is noteworthy. Also, flat micro-cores, narrow-face cores (Fig. 9, *3, 7*), and a variety combining features of narrow-face and conical cores (Fig. 9, *4*) have been noted. A series of double platform cores includes mostly nuclei bearing negative scars of opposing removals on single flaking surfaces. Cores with two flaking surfaces were classified into two major variants· those with scars of opposing removals and those revealing a longitudinal-transverse flaking pattern One core is interesting because flaking was executed from two wide surfaces; removals were detached directed from a "ridge". The series of multiplatform cores comprises implements of "discoidal" morphology (Fig. 9, *8, 11*). The spalls include technical (n = 32) and laminar (n = 237) varieties as well as flakes (n = 445). On average, the sizes of flakes and blades do not exceed 30 mm; the width of laminar spalls is 13 mm.

A tool kit totaling 452 specimens has been identified in association with culture-bearing horizon 6, which corresponds to 16% of the total collection of artifacts. "Spurs" represent the dominant tool type (n = 149). A series of tools with single cutting edges (Fig. 12, *13, 14*; 13, *9, 17, 19, 21, 22*) and those with double and multiple cutting edges (Fig. 12, *15*; 13, *18*) is noteworthy. The *grattoirs* (n = 33) are dominated by end-scrapers with straight and convex cutting edges (Fig. 13, *11 – 13, 20*) (n = 10). Short carinated end-scrapers were noted (Fig. 12, *16*; 13, *14*) as well as those with beveled cutting edges. Solitary examples of specific end-scrapers have been identified, including those with a lateral cutting edge and those with a sharp working element and a short cutting edge at the tool's angle. Ten atypical burins were fashioned through the removal of burin spalls (Fig. 12, *1*; 13, *5, 15*). The category of notched tools comprises 41 specimens and includes implements with one (Fig. 12, *3, 6, 9*, 13, *1*) and two retouched notches. Specific combination tools have been also noted (Fig. 13, *2, 16*). Denticulate tools (n = 25) demonstrate fine and medium serration (Fig. 12, *11*; 13, *8*). The category of chisel-like tools (n = 20) comprises a variety of items exhibiting bifacial reduction of cutting edges (Fig. 12, *2, 10, 12, 17*). One specific implement resembling a small chisel is noteworthy (Fig 13, *3*). Backed segments form a category of 49 specimens (Fig. 14). Such implements were likely used as inset elements of composite tools. The category of retouched blades totals 48 specimens, the majority of which (n = 30) are fragments. Two conventional groups were identified within this category: medium (from 13 to 23 mm wide) and small (from 6 to 10 mm wide) specimens. The series of medium blades is dominated by specimens bearing fine marginal retouch on their dorsal surfaces (Fig. 12, *5, 7*); specimens with small serrated treatment (Fig 13, *10*) and flat retouch (Fig. 13, *7*) are also numerous. Solitary implements bear retouch along the long side of the ventral surface (Fig. 12, *8*) and vertical retouch on their truncated surface (Fig. 12, *4*). An obliquely truncated blade bears scars of opposing retouch forming its straight and concave working edges Two blades are noteworthy because traces of ventral marginal retouch were noted on their striking platforms. Such treatment led to the formation of a slightly convex, short cutting edge. The series of micro-blades comprises 11 specimens, including the following varieties: those with one or two backed lateral sides flaked alternately (Fig. 13, *6*), those with longitudinal edges sharpened with retouch and a transverse backed edge (Fig. 13, *4*) The retouched flakes total 72 specimens. Dimensions of these tools vary from 10 to 25 mm. The tools in this category show signs of fine marginal, flat, serrated, and vertical retouch Pebble tools have been identified as hammerstones (n = 5) A few bone implements, including needle fragments and an anthropomorphic figurine, were also noted.

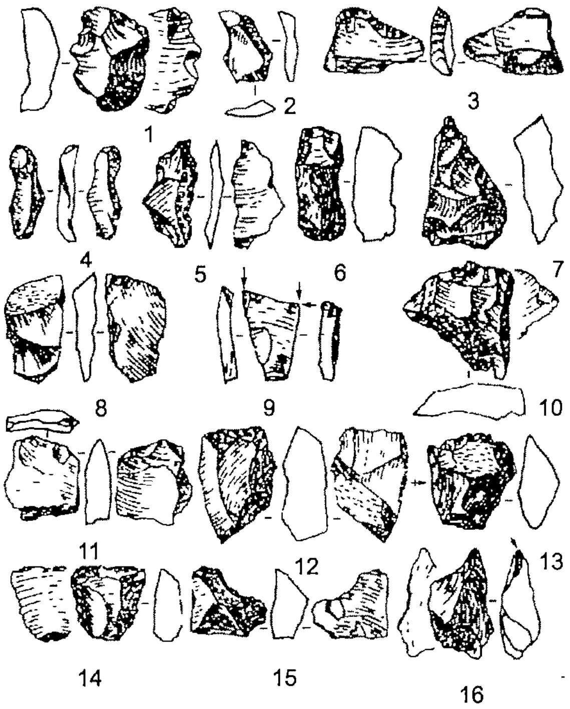

Fig 15 Lithic artifacts from Shestakovo culture-bearing horizon 5.

Culture-bearing horizon 5 has been identified within loess sediments of stratigraphic layer 17. The following ^{14}C dates are available for this layer: 18,040 ± 175 BP (SOAN-3610), 19,480 ± 310 BP (SOAN-3609), and 21,560 ± 100 BP (GrA-13234).

The lithic collection recovered from this horizon totals 440 specimens including chips and scales (n = 204). The core-like implements (n = 11) include both nuclei and core fragments The cores (n = 5) include a single platform small blade nucleus with one flaking surface demonstrating an initial stage of reduction; an amorphous core, and three cores from which blades were removed from their narrow faces (Fig. 9, *12*). The flaking face of one of these cores was prepared on the

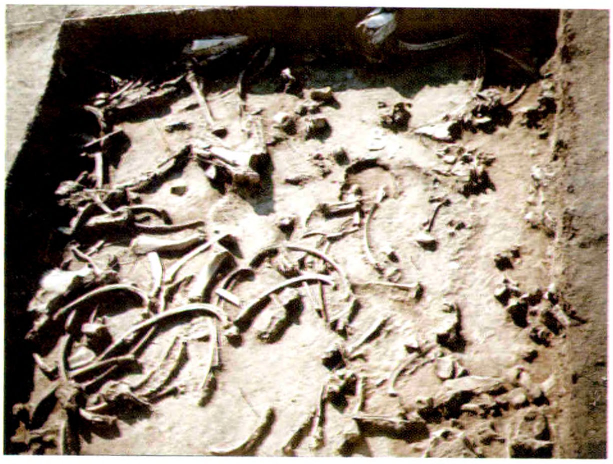

Fig. 16. Mammoth bone concentration in the lower bone-bearing horizon at Volchia Griva (excavation area 1 of 1991, section B).

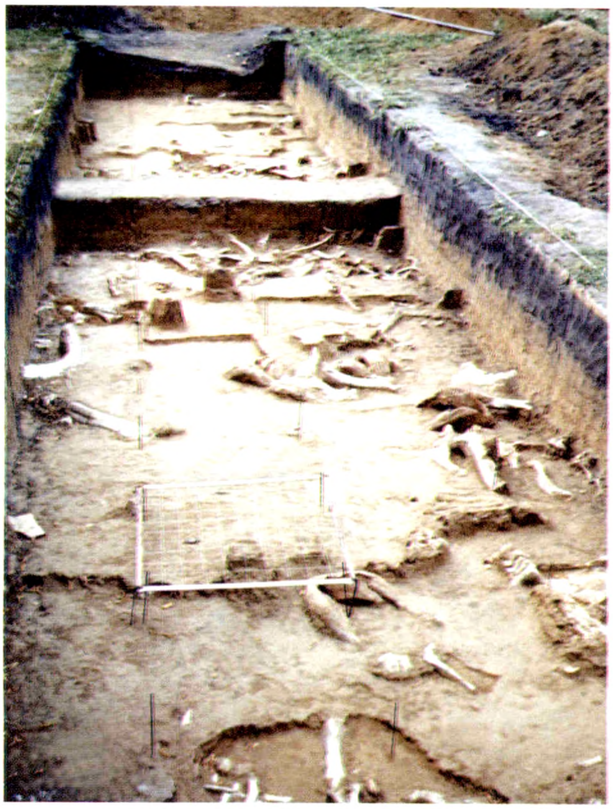

Fig. 17. Cleaning of mammoth bone concentration from the lower bone-bearing horizon at Volchia Griva (excavation area 2 of 1991).

triangular truncation surface of a primary flake. The keel is treated with unifacial abrupt scalar retouch.

The collection of spalls includes flakes (n = 91) as well as technical (n = 6) and laminar (n = 27) spalls. Flakes and blades are no longer than 25 mm, while the width of laminar flakes reaches 15 mm.

The tool kit identified within this collection totals 101 specimens (23%). The category of spurs is most numerous and includes 53 single specimens (Fig. 15, *2, 7, 8, 10, 16*). The category of *grattoirs* comprises nine specimens including several varieties: straight *grattoirs* (Fig. 15, *12*), an end-scraper (Fig. 15, *14*) and a *grattoir* with a lateral working edge, both fashioned on flakes, a carinated end-scraper on a massive fragment of rock shatter (Fig. 15, *6*), and three specimens demonstrating narrow cutting edges defined by a Clactonian notch (Fig. 15, *15*) or a retouched notch (Fig. 15, *3*) from one end. The two burins recovered were both made on angular artificially broken spalls (Fig. 15, *9*). Categories of denticulate (Fig. 15, *1, 5, 13*) and notched tools comprise ten and eight specimens, respectively. Notches demonstrate concave working edges bearing marginal retouch (Fig. 15, *4*). Four small single chisel-like tools have been identified within this collection (Fig. 15, *11*). A series of retouched blades also includes four fragmented items, 13 mm wide on average. Blades demonstrate mostly fine marginal retouch. Ten retouched flakes were encountered as well as one pebble hammerstone.

Volchia Griva. The site is situated on the eastern Baraba Plain (N 54°40' 21.6", E 80°20' 36.0"). The topography of this region consists of alternating small ridges and bottomland meadows. The site is located on the northeastern extremity of an 8 km long ridge whose width varies from 1.0 to 0.5 km; the relative elevation over the meadow (called Suminsky) is 10 m (the absolute elevation is 149 m). A concentration of mammoth faunal remains was recovered at the site in association with lithic artifacts.

Since 1957, when the site was discovered, Volchia Griva has been regarded as one of the largest localities in the world containing *in situ* remains of *Mammuthus primigenius* Blum. The site has been repeatedly investigated by experts in geology, paleontology, and archaeology (Polunin, 1961; Alekseyeva, Volkov, 1969; Okladnikov et al., 1971; Okladnikov, Molodin, 1978; Tseitlin, 1979; Alekseyeva, 1980; Orlova et al., 2000). Excavations at the site have revealed concentrations of mammoth bones (~ 50 individuals) and separate remains of bison, horse, and wolf. A few lithic artifacts have been recovered in association with bone remains suggesting human activity at the site. Geologists Polunin, Volkov, Tseitlin, and Leshchinskiy have described the stratigraphic sequence at the site. Initially, the age of the formation of the taphocenosis was estimated as final Pleistocene: 10 – 12 ka ago (Alekseyeva, Volkov, 1969; Tseitlin, 1979). A series of dates contradicting such age estimates was generated for this site on mammoth bones: 13,600 ± 230 BP (SOAN-111), 14,200 ± 150 BP (SOAN-78), 14,800 ± 150 BP (SOAN-111A). Enormous concentrations of bone remains over an area of about 20,000 sq. m served as a basis for numerous models and hypotheses seeking to

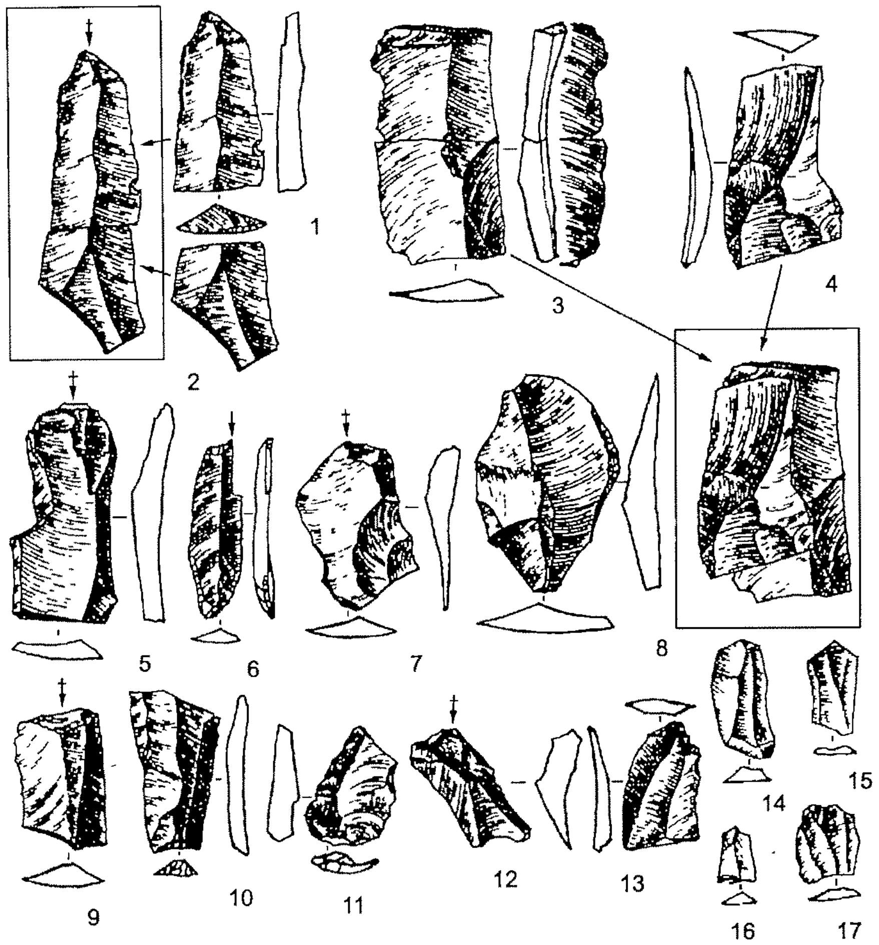

Fig. 18 Lithic artifacts from Volchia Griva.

explain the time and conditions of their formation (Okladnikov et al., 1971; Alekseyeva, Vereshchagin, 1970; Petrin, 1986).

During fieldwork in 1991, an excavation area of 163 sq. m yielded more than 2000 mammoth bones both in anatomical order and disarticulated as well as horse and bison bones (Fig. 16, 17). Two bone-bearing horizons were identified, partially adjoining one another. Bones from the lower horizon demonstrated a better state of preservation in comparison with those from the upper horizon. A few dozens of mammoth bones (mostly ribs) from the total collection recovered from the lower horizon exhibit a specific dark red coloration on their surfaces. Small nodules of reddish clayey rock were found in association with these ribs. The average thickness of bone-bearing horizons is 0.5 m. Although the lower horizon yielded signs of early human activity, reliable evidence suggesting the causes of bone accumulation were hardly available at that time of initial excavation.

The amount of available scientific information regarding the site has increased recently due to new stratigraphic observations, results of geo-chemical and palynological analyses, laboratory analyses of faunal remains and a new series of ^{14}C dates. The site was formed at a location of alkaline soil, a solonetz of the Ca-Na geochemical class, over a considerable period of time with possible hiatuses. Available ^{14}C dates generated on mammoth bones suggest that bone-bearing horizons were accumulated during different periods: 11,090 ± 120 BP (SOAN-4291), 12,520 ± 150 BP (SOAN-4293), 14,280 ± 285 BP (SOAN-4292) (Orlova et al., 2000), and 17,800 ± 100 BP (GIN-11463) (Stuart et al., 2002).

Available data allow the following preliminary inferences to be made.

1. The sediments of the ridge are mostly of aquatic origin. Fossils of the lower bone-bearing horizon were mostly embedded in sediments demonstrating irregular, horizontal, rarely slanting laminar structure typical of sediments resulting from slow water flow.

2. The first period of habitation of this territory may be correlated with drainage of the whole area during a dry climatic cycle. The second period may be correlated with a hiatus in loess formation.

3. Animal bones were likely accumulated during the second half of the Sartan period, in the interval between 18,000 and 11,000 years ago.

4. Traces of human activities at the site suggest short-term occupation occurring after the formation of the lower bone-bearing horizon had begun and did not persist throughout the entire period of animal bone accumulation.

Several seasons of excavation have yielded 37 lithic artifacts. Two flakes and a small pebble exhibiting negative scars of short, unidirectional removals were uncovered in 1968. The pebble tool exhibits abraded negative scars. The 1975 excavations produced four blade fragments (Fig. 18, *14 – 17*) and the collection of artifacts recovered in 1991 comprises 30 specimens.

Black and grayish-green siliceous rocks were used as the predominant raw material. A series of refittable blades were made on an indeterminate spotted blackish-gray rock. Solitary implements made of green, gray rock and dark brown jasper were also encountered. No core-like forms were identified. The collection of blade fragments includes dihedral and trihedral specimens (Fig. 18, *2, 5, 9*). The width of blades varies from 10 to 19 mm. The dorsal faces of most blades exhibit a longitudinal reduction pattern, rarely bi-longitudinal (see Fig. 18, *2*). The set of dihedral microblades comprises fragments from 3 to 7 mm wide. A small flake bearing evidence of bi-longitudinal working is noteworthy. It exhibits a dihedral convex platform and is reminiscent of laminar spalls (Fig. 18, *12*). An ovoid flake demonstrating a bi-longitudinal working pattern on its dorsal face and fine marginal retouch on its convex longitudinal edge was identified (Fig. 18, *8*). A set of diverse tools fashioned on blades has been recovered. One tool fashioned on a broken blade (Fig. 18, *1*) may be refitted to a separate fragment which shows no traces of secondary working (see Fig. 18, *2*). The longitudinal edge of this tool bears signs of extremely fine dorsal retouch. The transverse cleavage surface bears signs of vertical retouch. The striking platform has been removed by a diagonal (burin?) spall detachment. A fragmentary short laminar spall bears traces of abrupt dorsal retouch along one of its edges. The cutting edge was serrated with multifaceted retouch (Fig. 18, *11*). Similar treatment has been noted on another flake with a broken distal end (Fig. 18, *7*). Serration was also noted on a distal end of a fragmentary blade (Fig. 18, *13*). One specific tool was fashioned on a blade fragment (Fig. 18, *10*); irregular use-wear signs are evident on its longitudinal edge. The striking platform was destroyed through abrupt, regular retouch forming a slightly concave cutting edge. This method of forming a cutting edge on the proximal end of blades has been reported from many archaeological sites in Siberia including Malta (see Fig. 11, III) and the Achinskaya site (see Fig. 5, V) among others. Laminar flakes bearing marginal retouch on the ventral face may be refitted with available cores (Fig. 18, *3, 4*). Negative scars of removals from the dorsal faces of spalls suggest bi-longitudinal flaking of the cleavage surface with additional treatment of the margins. A burin with a lateral working edge (Fig. 18, *6*) was fashioned on a narrow retouched blade. The distal end was truncated with abrupt retouch and served as a concave striking platform for detaching a burin spall. The opposing narrow end was treated with marginal retouch. A curved dihedral microblade was identified within the series of micro-tools. One of its surfaces was treated with vertical, backing retouch. The other specimen within this series is the pointed fragment of a dihedral backed blade. The opposing edge, convergent with the backed margin, bears signs of sharpening retouch.· This specimen may be regarded as a micro-point fragment whose morphology is similar to implements of this sort reported from Shestakovo, Malta, and other sites. Despite its scantiness, the Volchia Griva collection of stone tools represents an interesting series whose morphology allows establishment of analogues to laminar micro-industries of the early Sartan period.

Discussion

The majority of Paleolithic sites on the West Siberian Plain have been attributed to the Sartan interval. These few sites vary in terms of their depositional conditions, geomorphological situation, and the number and composition of recovered archaeological materials. These sites do not form clear territorial groups because they are situated several hundred kilometers apart from one another. Stratigraphic circumstances and available radiocarbon dates suggest a wide chronological range for their occupation These sites have not been equally investigated and reported. For instance, the Tomskaya, Chernoozerie II, Shikaevka II, Mogochino, and Gari sites are rather well-documented in the extant literature. Only a few publications deal with the Novyi Tartas and Vengerovo-5 sites. Solitary stone artifacts were collected from the surface at Elban-3, Khaldeyevo, Chenrorechenski-1 and 2, Skripachi, and related sites, allowing only consideration of such sites as "possibly Paleolithic". Archaeological investigations at such promising sites as Gari II, Rychkovo, Evalga, Lugovskoe, Aryshevskoe-2, Sredneberezovski and others have just begun. Stone and mammoth bone artifacts, whose morphology and stylistic features suggest their attribution to the Paleolithic, are deposited in several research institutions in West Siberia and are practically unknown to the broader scientific community. The results of investigations at Achinskaya, Shestakovo, and Volchia Griva have been only partially published, although the scientific importance of the two latter sites is great for studies of the Siberian Paleolithic and late Quaternary stratigraphy. However, the scale of Paleolithic investigations on the West Siberian Plain has increased recently. New sites containing animal fossils and Paleolithic artifacts have been located, the list of available radiocarbon dates has been expanded, and new faunal collections have been analyzed. As a result, new insights into the West Siberian Paleolithic can be formed.

However, scarce reliable data have not provided sufficient grounds for more exact chronological affiliation of the currently identified Paleolithic industries of the West Siberian Plain It mostly concerns sites, the age estimates for which fall outside of the Sartan period. On the basis of available stratigraphic data, radiocarbon dates, and identified technical-morphological features, the Voronino-Yaya and Aryshevskoe-1 sites may be attributed to the Middle Paleolithic. ^{14}C dates in the range of 40 – 28 ka may be regarded as the upper chronometric limit for these sites. The Kordon, Bolshoi Ului, and Ust-Bolshoi Ului sites yielded penecontemporary archaeological materials. Deposition conditions noted at the Nekrasovskoe site suggest an early Zyrian antiquity. A set of artifacts with abraded surfaces established within the Bolshoi Kemchug collection has been preliminarily dated to the Middle Paleolithic or to the Middle-Upper Paleolithic transition. Artifacts from the Shestakovski hoard likely date to the initial Upper Paleolithic. In all appearances, the abovementioned sites may be grouped into a conventional class of "pre-Sartan Paleolithic industries" and attributed to the initial stages of human occupation of the West Siberian Plain.

The next stage in the development of Paleolithic industries on the West Siberian Plain is represented by sites associated with the Sartan cold oscillation. It should be noted that the objective potential for precise chronological determinations of the sites investigated is insufficient due to the scantiness of remains recovered from individual sites, availability stone artifacts, and our currently insufficient state of knowledge of relevant Quaternary deposits. Stratigraphic profiles of most sites were described 20 years ago and even earlier. Geological age was determined on the basis of the prevailing paradigms of that period. Radiocarbon age determinations (i.e., from Volchia Griva and Chernoozerie II) were declared improperly old. However, newly obtained ^{14}C dates have supported the older age determinations but still contradict age estimates generated on the basis of stratigraphic, paleontological, and archaeological evidence

On the basis of available radiocarbon dates, West Siberian Paleolithic sites may be subdivided into three conventional groups.

1. Shestakovo (layers 24 – 17), Mogochino I, Tomskaya, Shikaevka II, Lugovskoe, Rychkovo, and Evalga: 25.5 – 18 ka ago;
2. Gari, Berezovyi Ruchei-1 and 2, Troitskaya I (see Fig. 3, IV), and Volchia Griva (the lowermost portion of the lower bone-bearing horizon): 17.8 – 15.1 ka ago;
3. Chernoozerie II and Volchia Griva (the uppermost portion of the lower bone-bearing horizon): 14.5 – 14.2 ka ago.

Shestakovo, the only site from group 1, reveals a clear correlation between ^{14}C date and the relevant geological and paleontological evidence and typology of artifacts. The typological factor seems most important because the established combination of tool categories and types may serve as a basis for relative age estimates of other sites, for which age determinations are either unavailable or equivocal. Probably, in this case, specific rare tools are even more important than common "typical" artifacts (Vasiliev, 1996)

The Shestakovo technocomplexes reveal a predominance of small core-like forms and all types of spalls (2.0 – 5.0 cm). Given considerable variability within the tools themselves as well as variable combinations of tool types in collections associated with particular horizons, the general tendency of the industry as a whole is toward small blades, from 13 to 17 mm wide. Such blades were detached from cores exhibiting parallel reduction patterns including flat and narrow-face varieties, cores with multiple conjoining flaking surfaces, and cores with convex surfaces. Radial cores are rare. Typical wedge-shaped nuclei have not been found The general tendency of reduction is to produce the maximum possible number of spalls. Different types of pointed tools made on all types of spalls and shatter dominate the tool kit. Some of the implements from this series may be identified as classical "points", "borers", "engravers", etc. The following categories were also noted: denticulate tools, tools with retouched notches, and flakes and fragments with intentional marginal retouch. The known *grattoirs* are mostly fashioned on flakes. Carinated end-scrapers were also encountered. It is noteworthy that no *racloirs* have been found. Chisel-like tools with one, and rarely two, cutting edges are rare, as are burins, most of which were identified as angle-burins. The category of blades includes mostly implements with retouched lateral sides. Backed blades, blades with steep retouch on one surface, and specimens with retouched distal ends are rare but diagnostic elements. A specific type of blades has been identified: those fashioned with dorsal, marginal retouch of the striking platform resulting in the formation of a short, slightly concave cutting edge. Such a technological method, similar to truncation, is specific to the Siberian Paleolithic. It has been reported from several sites of the Malta affinity (see Fig. 5, 11, III). A set of 49 segment-shaped micro-points is noteworthy (see Fig. 14) (Derevianko et al., 2000: fig. 5). The maximum size of the tools does not exceed 13 mm. Points are slightly curved, the straight longitudinal side is backed with retouch, the ends are sharpened with fine retouch. Flaking patterns of the dorsal faces of such points suggest manufacture on diagonally cut blades or on chips and possibly scales detached from carinated end-scrapers. Similar micropoints, however, bigger in size and produced on microblades, have been reported from Malta, Achinskaya, and Kashtanka-1 (stratum 1). In summary, the Shestakovo artifact collection includes the following rare types specific to that industry: carinated end-scrapers on flakes, implements with wide, retouched *encoches*, blades with concave retouched working edges formed on the striking platform, backed blades, broken blades retouched on the breakage surface, blades with retouched distal ends, and backed segment micropoints. Analogous implements in various combinations have been reported from early Sartan sites in Siberia and roughly contemporaneous sites in the Urals and the Volga Basin (see Fig. 14, I, II) (Sherbakova, 1994; Istoria..., 2000). The Achinskaya blade-based assemblage includes distinctive tool types which are also known from Shestakovo, Malta, and some other sites in the Yenisei Basin. This fact allows us to attribute the Achinskaya industry to the early Sartan period.

Within group 1, there are a number of common features in the Tomskaya and Shestakovo assemblages. Tools were made on the same raw materials, blades are of similar sizes and dimensions, and proportions of retouched blades and implements with retouched notches are significant. The noted characteristic features of these lithic collections, the conditions of tools deposition, and fossils recovered in association with stone tools do not contradict the early Sartan attribution of the Tomskaya site. On the contrary, the Shikaevka II assemblage demonstrates many original features and includes implements on blades from 10 to 20 mm wide. Tool categories such as notched tools, blades with retouch on their transverse ends, and "geometric" blades, diagonally reduced through retouch, are noteworthy. This tool kit represents a unique feature in the Siberian Paleolithic, though it does not provide sufficient grounds to reject a ^{14}C date of 18,050 ± 95 BP (SOAN-2211) that was generated on mammoth bone. The noted scantiness of data available for the Lugovskoe, Rychkovo, and Evalga sites prevents us from detailed analyses of these industries and makes reference to available radiocarbon dates. More difficulties are involved with the correlation of the Mogochino I lithic collection with a radiocarbon date of 20,150 ± 240 BP (SOAN-1513) on mammoth bone The Mogochino I faunal collection contains rhinoceros bones, a fact that does not seem to contradict such age estimates. Available lithic materials demonstrate considerable similarities with the Afontova culture of the Yenisei basin, occurring during the second part of the Sartan cold oscillation (Petrin, 1986; Abramova, 1989). Given the "high variability of the Afontova culture" (Vasiliev, 1996) and the vagueness of its earlier chronological border, the Mogochino I lithic collection may be associated with the date provided above.*

Group 2 (Gari, Troitskaya I, Volchia Griva, and Berezovyi Ruchei-1 and 2) reflects a transition from early to late Sartan industries. Such features as the laminar character of tools and the presence of narrow-face cores and carinated end-scrapers (Troitskaya I) are still noted, and at the same time blades more than 20 mm wide appear (Shirokov, Kosintsev, Volkov, 1996). The Volchia Griva collection demonstrates the continuance of a tradition of retouching the transverse surfaces of broken blades and reforming striking platforms into concave cutting edges. The observed methods of secondary working allow us to agree to the earliest possible age estimations of this site.

The last chronological group (with ^{14}C dates) includes three culture-bearing horizons of the Chernoozerie II site and the uppermost portion of the lower bone-bearing horizon at Volchia Griva. The noted structure of Chernoozerie II includes dwellings, pits, hearths, and activity areas. This fact suggests certain changes in the economics of this ancient population and the seasonal character of this camp. Available archaeological data provide evidence of repeated visits to this camp in the past. During these visits, relatively long-term (weeks, months?) surface dwellings might have been erected The relatively large collection of stone tools collected from this area supports this hypothesis. Recovered fish bones and scales point to the changes in subsistence. Bones of beaver and wolverine in the faunal assemblage suggest a forest niche.

Available paleocarpological data allow us to infer that around 14 ka ago, the lower reaches of the Irtysh were vegetated with predominantly coniferous floral associations with an admixture of birch and willow species typical of tundra and tundra-forest (Krivonogov, 1988). Considerable changes occurred in the proportions of major tool types between the earlier and later collections. The Chernoozerie II tool kit is dominated by *grattoirs* (37% of the total number of tools) and "cutting" tools on blades and flakes. Prismatic cores were used for blade production. The technology of lithic insets for bone composite tools was well developed, as were ornamentation patterns on bone implements. The assignment of the Chernoozerie II stone and bone collections to the Paleolithic seems undisputable and available paleontological evidence supports extant radiocarbon assays.

The upper portion of the Volchia Griva profile yielded mammoth bones unassociated with any artifacts. This collection is interesting from a paleoecological point of view. The dates generated on these bones fall in the range of 13 – 11 ka ago,

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* The complex stratigraphy of this site does not exclude the possible redeposition of the dating sample.

Chronology and correlation of the major Paleolithic sites located on the West Siberian Plain and contiguous regions and dated to the second half of the Upper Pleistocene

Period	Sub-period	Horizon	Ka BP	The Urals, the Samara region on the Volga	The Kazakhstan hummocky plain	The Altai, Kuznetsk Alatau, the Sayan	The West Siberian Plain		The Middle Yenisei and the Lower Angara		East Siberia	
Upper Pleistocene	Late	Kargin	11			Kaminnaya Cave	Bolshoi Kemchug (late complex)					
			12					Elban-3 (?)				
			13	Zotinskaya Cave		Shumiha (?)		Vengerovo-5 (?)	Kokorevo-3	*Golubaya-1*		
			14	Kapova Cave Ignatievskaya Cave		Ushlep-6 (1, 2) Ui-2 (6)	***Volchia Griva (upper)***	***Novyi Tartas*** (?) *Chernoozene II*	Afontova Gora-2	Listvenka (6 – 12)	Strizhovaya Gora	
			15	Postnikov Ovrag (upper)		Mama	Berezovyi Ruchei-1, 2	Chernorechenskoe	Biryusa Ust-Kova (upper)	Novoselovo-7 Novoselovo-13 (1)		
			16	***Troitskaya I***		Bedarevo (?)	***Garl***	*Legostaievo* (?) *Skripachi* (?)	Kurtak-3	Kokorevo-4		
			17		?		**Rychkovo** ***Volchia Griva (lower)***		***Listvenka (19)*** **Volchikha**	Novoselovo-6		
			18	***Medvezhiya Cave*** ***Talitski***		***Makarakskaya*** *Ust-Kiyka*	***Shikaevka II*** ***Lugovskoe*** ***Tomskaya***	***Shestakovo (17)***	***Malyi Izhul-3***	*Nizhni Idzhir-1* ***Ust Izhul-2***	Sosnovy Bor (5) ?	*Krasnyi Yar (2)* *Krasnyi Yar (6)*
			19				Mogochino (?)		***Kurtak-6***	***Tarachikha***		
			20			*Denisova Cave (9)*	***Evalga***		***Shlenka*** ***Afanasieva Gora***	***Listvenka (20)***		***Malta (9)***
			21	***Postnikov Ovrag (lower)***		*Ushlep-6 (3, 4) (?)*				***Primorskaya-1, 2***	***Buret*** Shishkino-8	***Malta (8)***
			22			*Ui-1 (2)*		***Shestakovo (19)***	***Novoselovo-13 (3)***	*Kashtanka-1 (1)*		
			23				***Sredne-berezovskoe***				***Alekseyevsk-1***	Malta (7)
			24			Anui-2 (7 – 12) Sabahikha	***Achinskaya*** (?)	***Shestakovo (22)***	***Kurtak-4 (upper)***	***Ust-Kova (middle)***	*Igeteiski Log-1*	*Igeteiski Log-3*
			25		**Batpak-7**	Malaya Sya	Aryshevskoe-2	***Shestakovo (24)***	Kurtak-5			
		Sartan	30 50	**Mamontova Kuria** Solenyi Ovrag Zaikino Pepelishche	Semizbugu-2	Dvuglazka (4) Ushlep-6 (5 – 9) Anui-2 (13) Ust-Karakol-1 (5 – 11) Kara-Bom	Bolshoi Kemchug (early complex) Voronino-Yaya Aryshevskoe-1 Kordon Bolshoi Ului **Nekrasovskoe**		Afontova Gora-5 Kurtak-4 (lower) Ust-Kova (lower)		Makarovo-3 Sosnovy Bor (6) (?) Makarovo-4	

Note Site names in boldface indicate localities with mammoth bones, italics sites with micro-tools, dotted line chronological boundaries of the middle Late Paleolithic in Siberia suggesting the existence of "mammoth refugia" during the final Pleistocene resulting in the formation of natural death assemblages.

To summarize, archaeological materials from West Siberian Paleolithic sites may be grouped into two geoarchaeological classes, which coincide principally with the Gydansky and consequent stages of the Sartan period (*sensu* (Kind, 1974)). Class 1 comprises industries that can be characterized by a general microlithization of tools in periglacial zones under conditions of maximum cooling of the climate. It seems that only the Chernoozerie II industry, the artifact collection from culture-bearing horizon 3 at Shestakovo, and possibly certain parts of the collections from Berezovy Ruchei-1 and 2 (Lisitsyn, 2000) located in the Nazarovski lowlands of the southeasternmost West Siberian Plain may by included in class 2. The chronology and cultural affiliation of such sites as Novyi Tartas, Khaldeyevo, and some other localities cannot be clearly established at present.

Since the discovery of Malta and Buret, a number of new early Sartan Paleolithic sites have been found in the Chulym and Yenisei valleys, west of Lake Baikal, and in the Altai. Abramova (1989) attributed these sites to climatic-stratigraphic stage 2 (of four possible stages) or to the middle Late Paleolithic of Siberia. Vasiliev (1996) argued that these sites should be included in the early Sartan stage of development of blade industries. The established technocomplexes are based on a common reduction strategy aimed at the production of small blades. However, the typology differs from site to site as do proportions of major tool types within collections. Lisitsyn (2000) believes that the reduction strategy, secondary working patterns, and major tool categories in these collections demonstrate more similarity within this group than with collections attributed to the early or late stages of the Upper Paleolithic. Cultural affiliations have not yet been established. The early Sartan industries demonstrate certain features in common with the Late Paleolithic of Europe. As a result of such comparisons, the "classic" Malta technocomplex has been established. The lithic tools and Paleolithic figurines of Malta and Buret have such clear characteristic features that distinguish them from other Paleolithic sites in Siberia that this originality has initiated a debate concerning the origin of the Malta and Buret culture. The most popular hypothesis is that this culture was brought to Siberia from Europe (see (Markin, 1998)). Many researchers highlight a clear tendency towards tool diminution noted at early Sartan sites. Lisitsyn (2000: 124) thinks that, the tendency towards producing micro-tools is comparable to the similar phenomenon called the 'Gravettian episode' in Europe. Additionally, "tools became noticeably smaller, a phenomenon which cannot be explained from the point of view of existing economics or hunting methods" (Ibid.: 89).

We may suggest several discussion topics in the study of early Sartan industries in Siberia and on the West Siberian Plain in particular: (1) chronological boundaries of those industries aimed at small tool production; (2) explanations for the wide dissemination of technocomplexes bearing similar technical and typological parameters; (3) autochthonous and allochthonous characters of particular industries; (4) reasons for the trend towards producing micro-tools, and (5) reasons for the variability noted among tools within a single tradition and distinguishing local cultures.

In fact, these topics represent only a small portion of the range of basic themes of Paleolithic studies. Unambiguous solutions are hardly possible. Wide-scale interdisciplinary investigations of basic sites, like Malta or Shestakovo, have provided archaeological materials highlighting key points of research and suggesting possible explanations. Let us discuss some of them.

The Shestakovo micro-tool complexes were recovered from four horizons of interstratified aeolian-alluvial deposits. Their period of deposition is suggested by ^{14}C and AMS-dates which fall in the range of 25,660 ± 200 BP (GrA-13238) to 18,040 ± 175 BP (SOAN-3610). More precise chronological affiliation of particular archaeological materials is limited by the dating methods employed.

Shestakovo yielded cultural materials in association with remains of large mammals, most of which were identified as mammoth bones. Classification of the remains by age and sex has shown that spring and possibly fall were the most probable seasons of death. This death assemblage was likely formed at a location of alkaline soil exposure over several thousands of years. Similar events might have taken place at Volchia Griva. Recovered bones reveal use-wear signs suggesting their use for a variety of purposes (Derevianko, Zenin, 1998). The question of whether or not humans actually hunted mammoth has not yet been resolved. Taphonomic analyses of mammoth remains from Shestakovo and Volchia Griva have not provided sufficient grounds for linking bone concentrations with the hunting activity of humans. It should be stressed that while hunting might have been practiced, perhaps only emaciated, ill, and weak individual mammoths were targeted since they would have been less likely to offer resistance to human predators. Hunting healthy and strong megafauna should have been perceived as a potentially fatal and economically unprofitable undertaking. The life of a Paleolithic hunter living in a severe environment should have been highly estimated, while his death might have had grave consequences for his human community. Most probably, Stone Age hunters pursued gregarious animals and hunted the weakest individuals. Shikaevka II and Tomskaya produced archaeological evidence of animal butchery supporting this proposed behavioral model.

In-depth knowledge of animal behavior, major migration routes, and seasonal habitation areas helped Stone Age hunters foresee the time and place of mammoth concentrations. The solonetz sites and river fords seem to be the most suitable locations for mammoth hunting. Certain methods of passive hunting, like the placement of sharpened spikes and stakes, might have been used with the purpose of causing injury to mammoths' feet or trunks that would weaken the animal and render it easier prey. The purpose of numerous fragments of pointed bone implements (awls, spikes, etc.), representing a common finding at many archaeological sites, is still unknown. Their use as instruments for passive hunting seems quite possible.

Available evidence allows us to regard open tundra-steppe landscapes as typical of the West Siberian Plain during the late Kargin – early Sartan period of the later Upper Pleistocene. Paleoecological conditions, though changeable, mostly favored growth of mammoth populations and associated species. Climatic fluctuations impacted vegetation and, consequently, animal communities. Waterlogged plains became passable when permafrost extended south, attracting herbivores, especially mammoths. Seasonal migrations of gregarious animals in the periglacial zone might have stimulated mobility of human populations.

The distances, routes, and rhythms of hunting group migrations depended on many social and environmental factors. Environmental factors include latitudinal zones, elevation zones, local topography, easy procurement of raw material, and possibly, geo-chemical features of soils Petrographic analysis of the Shikaevka II, Gari, and Volchia Griva stone tools suggests that the sites are situated at a distance of 300 to 500 km from raw material provenances, helping establish the routes of ancient human communities in the central areas of the West Siberian Plain. Shestakovo, for instance, is situated a few tens of kilometers from possible raw material sources.

The mobility of ancient populations following large herbivores might be regarded as one possible explanation for the increasing diminution of stone tools over the period in question. The tendency to produce multifunctional tools led to certain standardizations in reduction strategies and a decreased number of specialized tool types. This tendency is most pronounced in the collections recovered from sites situated far from raw material sources such as Shikaevka II and Volchia Griva. On the contrary, the proximity of sites to raw material outcrops is always reflected in a long list of recovered tool types, including large instruments like side-scrapers and pebble tools. This tendency is illustrated by the collections from the Achinskaya site, Krasnyi Yar, Malta, Ui-1, and others. The mobility of hunting groups presupposes increased probability of inter-group contact. It assumes the possibility of "passing on the baton" of cultural and technical patterns which constitute particularly similar features noted in the industries springing up on the basis of completely different original cultures from far away areas. Similar subsistence strategies of human groups populating different regions possibly stipulated their ability to assimilate technical and typological innovations.

Diffusion of "cultural-technological" information might have occurred both from west to east and from south to north and vice versa. The possible transportation of finished tools from one place to another with consequent assimilation of new technology might have occurred. However, this cannot be regarded as proof of trans-continental migration. Siberia has not yet yielded archaeological evidence reliably supporting such a hypothesis. We do not think that a search for the "European" predecessors of Shestakovo and Malta or the "Asian" ancestors for the Talitski site would be fruitful.

The level of technical development of early Upper Paleolithic industries ensured the possibility for transition to early Sartan micro-industries representing the middle stages of the Upper Paleolithic The sites of Ust-Karakol-1, Kara-Bom, Anui-2, and Denisova Cave in the Altai (see Fig. 14, IV – VI) have yielded archaeological materials providing evidence of a relatively early (> 30 ka ago) appearance of small blade production technology. The Ust-Karakol-1 and Anui-2 collections include noteworthy micro-tools: micro-points, borers, and backed blades. Various forms of cores, from which flaking was executed from their narrow surfaces, including wedge-shaped varieties, represent another characteristic feature of these collections. It is noteworthy that similar nucleus forms with abraded surfaces have been reported from Semizbugu-2, northwest of Lake Balkash (Derevianko et al., 1993. fig. 30, *1*; 31, *1*). Derevianko (2001) argues that in North Asia, Upper Paleolithic cultures were formed on the basis of or under the impact from the Kara-Bom and Ust-Karakol traditions. To gain a new insight into the mechanisms of such a process is the task for future investigators.

Conclusions

Paleoenvironmental conditions of the West Siberian Plain impacted the processes by which new lands were occupied by human populations during the later Upper Pleistocene. Pre-Sartan sites are mostly located in the southeastern part of the plain, within the contact zone of piedmont areas of South Siberia. During the final Kargin period, the populated area expanded considerably beyond the upper Ob basin and included the Irtysh basin up to N 61°. The absence of suitable rock types may be regarded as the major obstacle for human occupation of central portions of the plain. People were forced to carry lithic raw materials and finished tools over several hundreds of kilometers while following migrating animal herds.

Petrographic analysis has shown that lithic raw materials and tools were brought to the central plain from surrounding montane areas including the Urals and the Kazakhstan hummocky plain. This fact suggests the major directions of human migrations and the locations of inhabited areas

The highest migration activity of Paleolithic human groups is correlated with periods of maximum cold and aridity. The mobility of human groups might have caused the trend towards size reduction of Paleolithic tools as well as the notable standardization of tool types. Subsequently various specific microindustries were formed on this basis in Siberia. However, these industries were formed on different cultural grounds (see Table). Technocomplexes based on small and medium blades are most numerous (e.g., Shikaevka, Volchia Griva, Achinskaya) as well as those based on blade and flake utilization (e.g., Shestakovo, Tomskaya). The domination of blade reduction patterns is noticeable in industries based on high quality raw materials such as those recovered from Malta, Buret, Tarachikha, Volchikha, Shlenka, and Listvenka. Artifact collections from these sites reveal a "classic" composition of tool types suggesting a common cultural basis of these technocomplexes. On the other hand, industries based on poorer raw material types (e.g., Shestakovo, Ui-1, Kashtanka-1, and Ushlep-6) reveal greater proportions of flakes and flake tools. The question of whether this feature marks technological differences (blade and flake traditions) or is the result of petrophysical characteristics of the raw material used is still open (Vasiliev, 1996).

The Siberian early Sartan industries demonstrate a common reduction strategy and reveal similar major tool categories. Differences are noted in the secondary treatment patterns and typological composition. At the same time, certain tool types revealing surprising similarities have been recovered from sites located at great distances from one another, especially as concerns micropoints, short carinated end-scrapers, blades with convex edges formed on striking platforms, backed blades, and blades bearing retouched notches. Thus, specific Paleolithic technocomplexes demonstrating similar features in microtools dating from the chronological range of 25 (27) to 18 (16) ka ago have been reported from vast territories of Siberia stretching from Lake Baikal to the Urals and further to the west. This technological tradition is rooted in the industries of the early Upper Paleolithic. Such industries were subsequently developed during the second half of the Sartan period, making the differences in technocomplexes more pronounced.

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MIDDLE AND UPPER PALEOLITHIC FORAGERS OF THE SOUTHWEST CAUCASUS: NEW FAUNAL EVIDENCE FROM WESTERN GEORGIA

Introduction

Occupying an intermediate region between Africa, Europe, and Asia the southern Caucasus has represented a northern geographic barrier for major expansions and migrations of human populations, both Archaic and Modern, throughout much of prehistory. Western Georgia, located between the Caucasus ranges, the Likhi hills and the Black Sea, is a region known for its wealth of prehistoric sites, most of which are found in the river valleys that drain the Caucasus Mountains. Past research in this region established a cultural and paleoenvironmental record (Liubin, 1989; Adler, Tushabramishvili, 2002; Bar-Yosef, Belfer-Cohen, in press). Faunal studies were conducted solely as paleontological investigations, resulting in presence/absence lists, without any zooarchaeological or taphonomic considerations. A recent Georgian-American-Israeli joint project centers on the excavations of two sites: Ortvale Klde Rockshelter and Dzudzuana Cave. This paper provides preliminary results of our detailed taphonomic and zooarchaeological analysis of the faunal remains from the new excavations at these sites between 1996 and 2001.

The site of Ortvale Klde Rockshelter is located in the Cherula River valley, approximately 5 km west of Dzudzuana Cave, which is located in the Nekressi River valley. Both are tributaries of the Kvirila River, which drains the slopes of the southwestern Caucasus. The two sites are located within the same ecological and geographical setting and provide a continuous cultural sequence. The sequence begins at Ortvale Klde with five major late Middle Paleolithic layers, capped by three thin Upper Paleolithic horizons, and continues at Dzudzuana with two major and thick Upper Paleolithic depositional ensembles dated to 30 – 20 ka and 13 – 11 ka BP. The lower ensemble at Dzudzuana is contemporary with the Upper Paleolithic horizons of Ortvale Klde and the upper ensemble resembles Epi-Gravettian manifestations in the region (see (Adler, Tushabramishvili, 2002; Meshveliani, Bar-Yosef, Belfer-Cohen, in press)).

The site of Ortvale Klde is situated at approximately 530 m above sea level, 35 m above the gorge, and faces to the east. The new excavations were carried out in 6 sq. m in the southern chamber of the Rockshelter (for site plan and area of recent excavation see (Adler, Tushabramishvili, 2002)). The site of Dzudzuana is situated in a similar environment (560 m above sea level, 12 m above floor of the gorge). The cave is large and elongated, emerging as a tunnel from which a small creek flows. The new excavations were carried out in 16 sq. m at the mouth of the cave. All of the excavated sediments from both sites were sieved with 2 mm mesh (wet sieving at Dzudzuana and mostly dry sieving at Ortvale Klde), and were processed according to their spatial and stratigraphic location.

We carried out a detailed taphonomic and zooarchaeological analysis focusing on the two sites in order to achieve a better understanding of the differences and similarities between the late Middle Paleolithic and the Upper Paleolithic in the region. Here we focus particularly on the two most abundant species exploited during that period – the Caucasian goat (*Capra caucasica*) and the extinct steppe bison (*Bison priscus*). These two species provided the economic base for the inhabitants of both sites over the whole span of their occupations. Our principal goal is to examine how the people of the

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Middle Paleolithic (presumably Neanderthals) varied in their foraging behaviors from Upper Paleolithic foragers. Another aim is to reconstruct the depositional history of each of the sites and to observe inter-assemblage differences in their formation processes.

Faunal analysis procedures

The zooarchaeological and taphonomic analysis proceeded as follows.

Bone fragments were identified in the field to the maximum number of skeletal elements including cranial fragments, vertebrae, ribs, and shaft fragments which were identified to size class only. Taxonomic identifications were verified with the assistance of Prof. A. Vekua from the Tbilisi State Museum.

The abundance of different taxa was quantified using NISP (number of identified specimens) and MNI (minimum number of individuals from which the assemblage originated). These values were calculated using the assumptions described in Klein and Cruz-Uribe (1984). Since bone fragments constitute the overwhelming majority of identified elements, we documented the identified bone elements in our protocol by describing which bone of the body is being coded, what portion of the bone is present (i.e., proximal epiphysis, distal epiphysis, diaphysis, etc.), and more specifically, what part of the bone portion is represented (e.g., lateral-medial, dorsal-ventral, caudal-cranial). In addition, each bone element was coded according to its fraction of complete part (i.e., percent of preservation). When possible, shaft fragments were coded according to specific diagnostic zones All identified elements were then summed to estimate the number of complete bones. In this method MNIs do not depend on the degree of fragmentation (Ibid.).

Recorded elements were searched for butchery marks and signs of animal activities (Fisher, 1995). In addition, we searched for bone surface modifications indicating post-depositional bone weathering (Behrensmeyer, 1978), abrasion (Shipman, Rose, 1988), and fluvial transport (Shipman, 1981).

The mode of bone fragmentation was analyzed for all bone fragments bearing ancient fractures (fragments with recent breakage fractures caused during the excavation were ignored). Fracture angle, outline and edge were assessed in order to determine the stage at which the bones were broken (i.e., fresh *vs.* dry; for typological description of fractures see (Villa, Mahieu, 1991)).

The distribution of various skeletal elements of Caucasian goat and steppe bison, grouped into four carcass parts (head, trunk, limbs, and toes) was studied in order to determine which body parts were present at the site. The observed values for each body part were calculated based on MNE values, and the expected values were based on MNIs obtained for each species.

Age structure of the major hunted species (Caucasian goat and steppe bison) was analyzed on the basis of tooth wear We followed Stiner (1994) in distinguishing three broad age classes: juvenile, prime adult and old adult, using the eruption and tooth wear patterns of the deciduous lower fourth premolar (dP_4) and lower third molar (M_3).

The bone assemblages of Ortvale Klde and Dzudzuana

Thus far, a total of 2,538 complete and fragmentary bones from Ortvale Klde (derived from a minimum number of 40 individuals) and of 1,628 complete and fragmentary bones from Dzudzuana (derived from a minimum number of 28 individuals) were identified to species (including elements that were identified only to body size group). The relative frequencies of the main hunted species in each of the assemblages are detailed in Fig. 1. The Caucasian goat is the most common taxon in all layers at Ortvale Klde, which date to the late Middle Paleolithic and the early Upper Paleolithic. In the Upper Paleolithic layers of Dzudzuana the proportion of the Caucasian goat decreases in favor of steppe bison. It could be that the differences observed between Ortvale Klde and Dzudzuana may reflect differences in land use, but this pattern is less clear. Both species constitute more than 90% of each total assemblage. Other game species are represented in small proportions and include aurochs (*Bos primigenius*), red deer (*Cervus elaphus*), roe deer (*Capreolus capreolus*), wild boar (*Sus scrofa*), equid (possibly *Equus caballus*), fox (*Vulpes vulpes*), and bear (possibly *Ursus spaleaus*).

The abundance of the Caucasian goat at Ortvale Klde is remarkable and thus far is the first and only Middle Paleolithic site in the Caucasus with such a frequency of this species. Predominance of mountain goat has been also observed at the Mousterian site of Teshik-Tash in Uzbekistan (*Capra sibirica*, over 80%) (Gromova, 1949), and at Mousterian sites in Spain (e.g., Zafarraya and Acklor) (Altuna, 1989; Straus, 1986, 1992; Barrozo-Ruiz, Hublin, 1994) and southern France (e.g., Hortus and Crousade) (Delumley, 1972)* (both *Capra ibex*). Barakaevskaya Cave, located several hundred kilometers west of Ortvale Klde in Goubs Canyon (Northern Caucasus), contains a faunal assemblage with one of the highest percentages of Caucasian goat (28.2%) (Liubin, 1998). By and large, though, the Caucasian goat is poorly represented at Middle Paleolithic sites in the Caucasus (Hoffecker, Baryshnikov, Potapova, 1991; Baryshnikov, Hoffecker, 1994; Baryshnikov, Hoffecker, Burgess, 1996).

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* See also: Gerber S.P La faune des grandes mamimiferees du Wurm ancien dans le sud de la France. PhD Dissertation. Univ. De Provence, France, 1972 (unpublished)

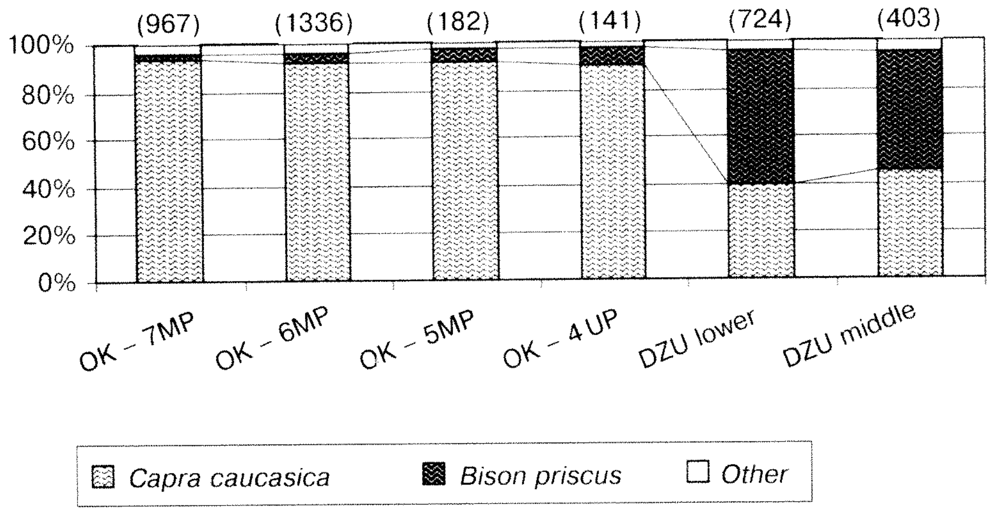

Fig. 1. Relative frequencies of the main hunted species from the Middle Paleolithic (OK – 7MP to OK – 5MP) and Upper Paleolithic (OK – 4UP) levels of Ortvale Klde and Dzudzuana (DZU lower and middle). Other species include mainly aurochs, red deer, fox, and bear. In parentheses, NISPs are given for each level.

The Caucasian goat lives along steep rocky slopes at elevations between 800 – 2400 m and it operates dramatic seasonal migration that can cover a vertical distance of more than 1500 m. In the early spring they climb high into the mountains, descending into the higher part of the boreal forest in the late fall. Similar seasonal vertical migrations, although less distinct, were operated by recent populations of the steppe bison in the southern Caucasus (Heptner, Naumov, 1989).* Thus, on the basis of this observation the high proportions of Caucasian goat and steppe bison at each of the assemblages may reflect hunting activities that occurred during the late fall or the winter.

Age distribution of Caucasian goats from the Middle Paleolithic layers of Ortvale Klde and of steppe bison from the Upper Paleolithic layers of Dzudzuana clustered into three main age categories, based on the eruption and wear of the deciduous lower fourth premolar and lower third molar, shows hunting emphasis on prime-age adults (Fig. 2). The mortality pattern clearly shows that both goat and bison culling fall in the "ambush predator" portion of the triangular diagram, near the median values obtained by Stiner (1994) for the Middle Paleolithic and late Upper Paleolithic of Italy and the prey age classes obtained by Speth and Tchernov (2001) for the Middle Paleolithic layers of Kebara Cave from Israel. Prime-age dominated assemblages are also reported for Middle Paleolithic bison kill sites from Europe.

The taphonomic history of Ortvale Klde and Dzudzuana

The taphonomic history of Ortvale Klde and Dzudzuana reveal that different depositional processes shaped each of the assemblages. While the bone remains from Ortvale Klde include the whole range of bone densities, including porous parts such as the central part of Atlas vertebrae (0.07 g/cc; (Lyman, 1994) based on *Ovis aries* bone densities) and caudal ischium (0.11 g/cc), the Dzudzuana assemblage is dominated by very dense bones, and contains mainly shaft fragments (over 0.4 g/cc) and teeth. This observation suggests differential rates of preservation of bone materials from Dzudzuana owing to mediated attritional processes, which could have occurred at the time of occupation and/or due to post-depositional processes.

Analysis of the breakage pattern of the bones, according to fracture angle, fracture outline, and fracture edge, examined on all long bone epiphyses, varies considerably between all four layers of Ortvale Klde and the two layers of Dzudzuana (Table 1). High proportions of dry bone fractures (i.e., right angle, transverse outline, and smooth edge) characterize Dzudzuana, while high proportions of fresh bone fractures (i.e., oblique angle, V-shaped outline, and jagged edge) characterize Ortvale Klde. A tree diagram for measuring similarity of the ratio of fresh bone fractures from the different levels of the two sites places the two layers of Dzudzuana distinctively apart from the four layers of Ortvale Klde (Fig. 3). These results suggest that mode of bone fractures found at Dzudzuana shows relatively high proportion of dry fractures, resulting most probably from trampling, due

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* See also: Vereshchagin N.K. The Mammals of the Caucasus: A History of the Evolution of the Fauna. Translated from Russian by the Israel Program for Scientific Translations, Jerusalem, 1967.

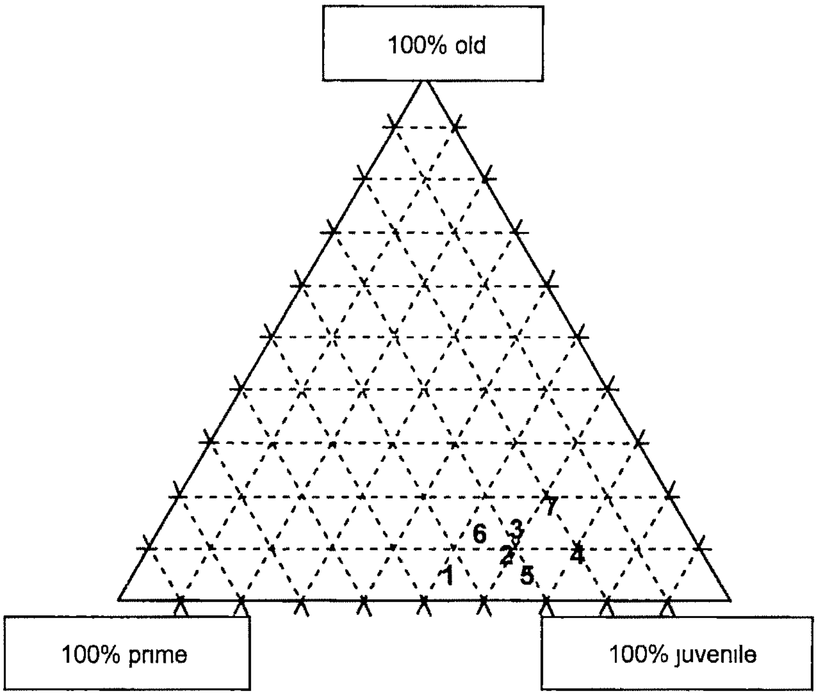

Fig 2 Mortality patterns of Caucasian goat in the Middle Paleolithic levels of Ortvale Klde (1) and steppe bison in the Upper Paleolithic levels of Dzudzuana (2) in comparison to the median values from the Middle Paleolithic (3) and the late Upper Paleolithic (4) sites from Italy (Stiner, 1994), and in comparison to mortality patterns of gazelle (5), fallow deer (6), and red deer (7) in the combined Middle Paleolithic sample from Kebara Cave, Israel (Speth, Tchernov, 2001)

to either weathering or sediment compaction processes, and indicate that most of the bones from Ortvale Klde were fractured and survived in their fresh conditions.

Results of the taphonomic analysis reveal that the high frequency of dry bone fractures found at Dzudzuana can be related to physical erosion processes, which occurred after the depositional phases at the site, as evidenced by the high rates of abraded bones and the relatively wide distribution of bleached and eroded bones. In addition, the Dzudzuana bone assemblage bears evidence for severe advanced stages of bone weathering (stages 3 – 5 out of 6 of Behrensmeyer (1978) weathering scheme). The percentages of each of the studied attritional process from levels at both sites are detailed in Table 2. These results suggest that skeletal elements at Dzudzuana were probably exposed to more aerial weathering and were buried in less favorable sedimentological conditions in comparison to the bone assemblages from all levels of Ortvale Klde Adequate representation (Voorhies Group III) (Voorhies, 1969) of bone elements according to their surface-volume ratio at both Dzudzuana and Ortvale Klde, suggests that the loss of bones owing to fluvial transport is not very likely.

In addition, chewing, gnawing, and scratching marks (see (Fisher, 1995) for description and reference) are low and infrequent on all identified and unidentified elements from both assemblages (Table 2) suggesting that destruction of bone elements by carnivores and rodents was insignificant. The limited evidence of carnivore modifications indicates that both assemblages were not accumulated or significantly altered by carnivores. The presence of two carnivore marks on the inner parts of an occipital skull fragment of Caucasian goat from Ortvale Klde further supports the claim that carnivore activity at the site is associated with post-depositional processes.

Food transport and processing at Ortvale Klde and Dzudzuana

The Caucasian goat remains from Ortvale Klde exhibit marks from all stages of preparation (n = 42). Only three cut marks were found on unidentified shaft fragments of bison from Ortvale Klde. The majority of the butchery marks on the goat remains were made during the process of dismembering the carcass (71%, using the Binford (1981) cut marks typology). Other butchery marks indicate skinning (5%) and filleting processes (24%). Dismemberment cut marks are often deeper and more pronounced than filleting cut marks, and are more abundant than skinning cut marks that are almost exclusively scattered along distal metapodia and horn

Table 1. Relative frequencies of fracture angle, fracture outline, fracture edge, and shaft circumference on bones from Ortvale Klde (levels 7MP to 4UP) and Dzudzuana (lower and middle Upper Paleolithic levels)

Site	Level	Fracture angle			Fracture outline			Fracture edge		
		Oblique (fresh)	Right (dry)	Intermediate	V shaped (fresh)	Transverse (dry)	Intermediate	Jagged (fresh)	Smoothed (dry)	Intermediate
Ortvale Klde	4UP	23 (88%)	2 (8%)	1 (4%)	22 (84%)	2 (8%)	2 (8%)	24 (92%)	1 (4%)	1 (4%)
	5MP	12 (80%)	1 (7%)	2 (13%)	11 (74%)	2 (13%)	2 (13%)	13 (87%)	0 (0%)	2 (13%)
	6 MP	153 (74%)	18 (9%)	36 (17%)	135 (64%)	19 (9%)	58 (27%)	153 (72%)	25 (12%)	34 (16%)
	7MP	76 (74%)	12 (12%)	15 (14%)	17 (70%)	11 (11%)	19 (19%)	70 (70%)	7 (7%)	23 (23%)
Dzudzuana	Lower UP	57 (48%)	53 (45%)	8 (7%)	51 (44%)	48 (41%)	18 (15%)	54 (47%)	48 (41%)	14 (12%)
	Middle UP	75 (57%)	35 (26%)	22 (17%)	62 (47%)	27 (20%)	43 (33%)	44 (33%)	46 (35%)	42 (31%)

cores (Noe-Nygaard, 1989). The Dzudzuana assemblage contains only a small number of cut marks on both the goat and the bison remains, which is most probably due to the poor surface preservation of the bones.

The distribution of various skeletal elements of goat from the two major Middle Paleolithic layers of Ortvale Klde, grouped into four carcass parts (Fig. 4), reveals a different representation pattern from that expected in both occupation layers. The observed values are based on MNE and the expected values were calculated based on MNI. The ratio of the observed to the expected shows low representation of trunk and limb elements, moderate representation of heads, and a high representation of toes. Under-representation of vertebrae is common in many assemblages (e.g., (Brain, 1981; Stiner, 1994)) and may result from various cooking and processing techniques. In addition, we found a relatively high proportion of scapulae and pelves, suggesting that certain axial elements were present at the site. The high frequency of toes in comparison to limb elements was observed for class 2 bovids (which are equivalent in their size to the Caucasian goat) in Hadza base camps due to butchering of the carcasses at the kill site and carrying the filleted meat from the heavier limb bones with the skins which remain attached to the phalanges (Monahan, 1998).

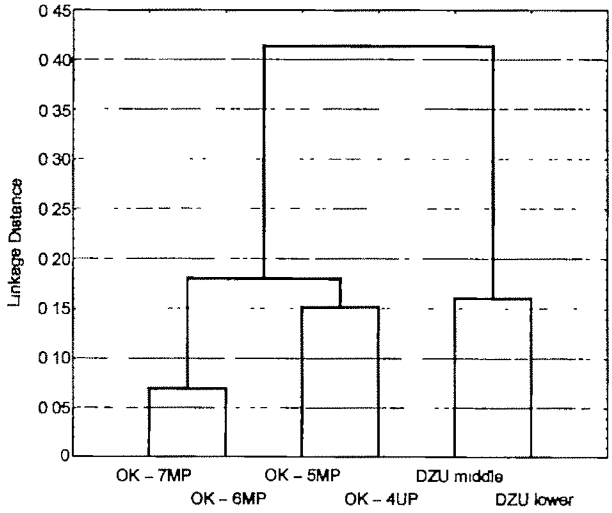

Fig 3 Tree diagram (based on cluster analysis) measuring the similarity of fresh bone fractures from Ortvale Klde (OK – 7MP to OK – 4UP) and Dzudzuana (DZU lower and middle), based on proportional frequency of fracture angle, outline, and edge.

It could be that the low rate of limbs, in comparison to head parts, may be related to the season of the site occupation. Ethno-zoological observations show

Table 2. Values of specific attritional processes on bones from Ortvale Klde (levels 7MP to 4UP) and Dzudzuana (lower and middle Upper Paleolithic levels), %

Site	Level	Abraded	Bleached	Weathered (>stage 2)	Fluvial transport	Carnivore marks	Rodent marks
Ortvale Klde	4UP	0	0	8	VG III	8	2
	5MP	0	0	0	VG III	7	2
	6MP	0	0	0	VG III	7	3
	7MP	0	0	5	VG III	5	3
Dzudzuana	Lower UP	12	2	35	VG III	1	1
	Middle UP	20	9	76	VG III	4	3

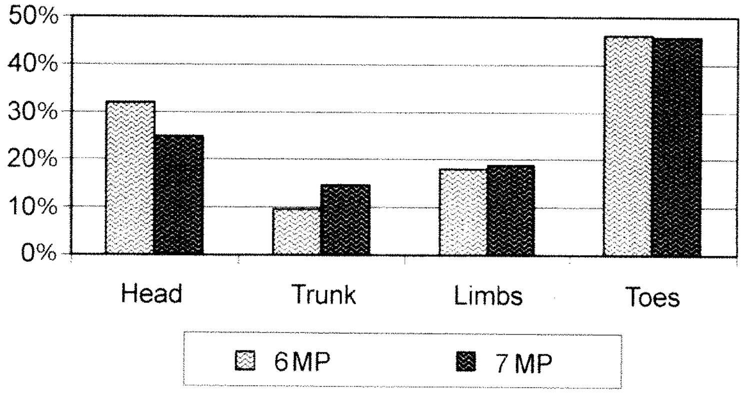

Fig. 4. Body part representation of Caucasian goat from Middle Paleolithic levels 6 and 7 of Ortvale Klde, pooled into four carcass parts (expected values are based on MNI and observed values are based on MNE).

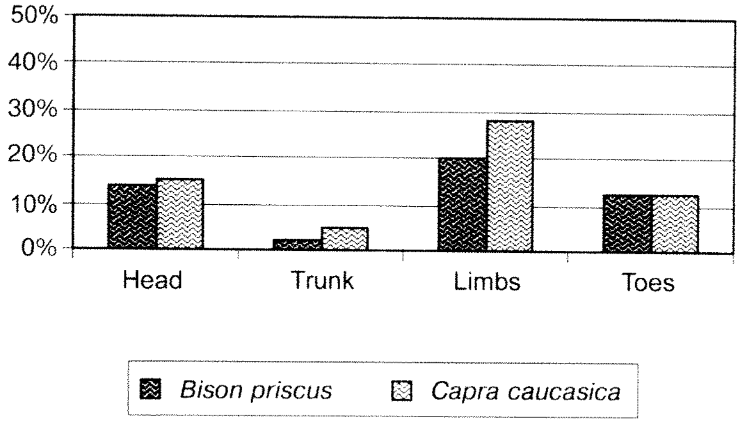

Fig. 5. Body part representation of Caucasian goat and steppe bison from Dzudzuana (lower and middle assemblages combined), pooled into four carcass parts (expected values are based on MNI and observed values are based on MNE).

preference for the crania and toes during lean seasons, when the amount of fat and quality of the meat in the limbs decreases (Speth, 1987, 1989; Lupo, 1998). Thus, the skeletal parts profile found at Ortvale Klde may reflect hunting activities that occurred during the winter, after the goat's body and marrow condition had begun to decline. The skeletal part distribution for both steppe bison and Caucasian goat from Dzudzuana (lower and middle assemblages combined) display anatomical profiles that approximate anatomical completeness, apart from the problematic counts of the vertebral elements (Fig. 5).

Conclusion

In this study we have attempted to highlight the foraging behaviors and the depositional histories of the bone assemblages from Ortvale Klde and Dzudzuana These preliminary results enable us to draw broad conclusions regarding differences and similarities in hunting, butchering, and transport strategies of late Middle Paleolithic and the first Upper Paleolithic occupants of the foothills of the southwestern Caucasus.

Low frequencies of carnivore activities may imply that human occupation was frequent and lasted for prolonged periods of time at both sites.

The presence of cut marks relating to all stages of processing among the remains of the Caucasian goat from Ortvale Klde suggests that butchering was carried out within the site.

The dominance of Caucasian goat at Ortvale Klde suggests that specialized hunting practices of predictable, migratory herds was a major element in the Neanderthal food-management strategies in the foothills of the southwestern Caucasus. The abundance of goats at both sites and its skeletal parts profile at Ortvale-Klde, coupled with the abundance of bison at Dzudzuana may indicate that hunting activities were conducted during late fall or winter.

Analysis of prey age classes of goat and bison shows that the Middle Paleolithic inhabitants of Ortvale Klde and the Upper Paleolithic inhabitants of Dzudzuana were capable hunters, preferentially targeting prime adult prey.

The taphonomic and demographic data further suggest that the remains represent active hunting in a manner that implies a high degree of planning and organization, rather than foraging based on an opportunistic strategy of chance encounter.

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DISCUSSION

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MIND THE GAP: QUESTIONS OF CONTINUITY IN THE EVOLUTION OF ANATOMICALLY MODERN HUMANS AS SEEN FROM THE LEVANT

Inquiries into the biological origins of anatomically modern humans have been a central issue in paleoanthropological research for at least a century. More recently, since the 1980s, the topic has sparked renewed interest and debate. As outlined by M. Nitecki and D. Nitecki (1994), the central issue of the debate is documenting the geographic origins of modern humans. Secondary to this concern are the additional questions of when modern *Homo sapiens sapiens* first appeared and which of the archaic hominid(s) was most likely their ancestor.

Presently, there are two competing models that attempt to deal with these issues. One is generally referred to as the "Out of Africa" hypothesis (Stringer, 1992, 1996, 1998, 2001; Stringer, Andrews, 1988), and the other is known as the "Multiregional" hypothesis (Hawks, Wolpoff, 2001, Wolpoff, 1989a, b, 1996, 1999; Wolpoff, Wu, Thorne, 1984). Common to both is the assumption that the species *Homo* first appeared in Africa and, through range expansion, eventually occupied other regions of the Old World. The multiregionalists argue that the most significant expansion began at around 1.8 million years ago. With the very early entry of archaic *Homo* into Eurasia and the Far East, came the establishment of local populations, each of which eventually evolved into indigenous modern *Homo sapiens* with their own local characteristics. The Out of Africa model hypothesizes that anatomically modern *Homo sapiens* appeared much later as a new species in Africa, somewhere between 200,000 to 150,000 years ago. The subsequent dispersal of this new species into other regions of the Old World resulted in the replacement of the indigenous archaic populations.

An additional comparison resulting from these two models is that they each view, in different ways, continuity in human evolution as it proceeded outside of Africa. The multiregionalists see very long-term continuity throughout Eurasia and the Far East beginning with early archaic hominids and culminating in the emergence of anatomically modern *Homo sapiens*. The opposing model, with its emphasis on the replacement of earlier archaic forms, sees continuity outside of Africa beginning only much later with the establishment of a fully modern humanity.

It is now generally recognized that the Levant, with its rich fossil hominid record associated with the Middle Paleolithic, is a key region for clarifying some of the questions relating to modern human origins (Bar-Yosef, 2000; Kramer, Crummett, Wolpoff, 2001; Stringer, 1989; Wolpoff, Caspari, 1997). Proponents of the two opposing hypotheses find evidence in the paleontological data from this region that supports their respective models. However, there is an aspect of the fossil sequence that has relevance for both of the models. Reference here is to a significant gap in the fossil record; a gap that brings into question the evolutionary continuity assumed under each hypothesis.

The hominid remains

The primary sites to be considered that have yielded hominid remains are Tabun, Skhul (Garrod, Bate, 1937; McCown, Keith, 1939), Qafzeh (Vandermeersch, 1981), Kebara (Bar-Yosef et al., 1992) and Amud (Suzuki, Takai, 1970; Hovers et al., 1995; Rak, Kimbel, Hovers, 1994). The first human remains associated with the Middle Paleolithic to be discovered were those recovered from the Mount Carmel caves of Tabun and Skhul. From the beginning, their relationships and taxonomic placement were a matter of debate. The problem was that the

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materials from these two neighboring sites exhibited considerable variability, even though both were assigned to what was then called the lower Levallois-Mousterian (Garrod, Bate, 1937). McCown, who excavated Skhul and was responsible for studying the finds together with Keith, argued that two distinct populations were represented (McCown, 1934) and that the female skeleton from Tabun could be defined as a Neanderthal. Keith, on the other hand, in a note to McCown's paper, felt that the remains from the two sites belonged to a single Neanderthal population, but did state that they were of slightly more modern in character than the Neanderthals of Europe. In the final monograph (McCown, Keith, 1939), Keith's view prevailed and all of the individuals were placed within the same taxon, *Paleoanthropus palestinensis* The problem for them was in explaining the extreme variability between the two samples. They raised the possibility of interbreeding between Neanderthal and Cromagnon types, but rejected it with the explanation that the Mount Carmel hominids, falling between Neanderthal and more modern forms, were in the throes of evolutionary change. Thus, they regarded the "tendency of the Mount Carmel people to diverge into two types as being due not to miscegenation, but to an evolutionary divergence" (Ibid.: 14).

The uncertainties concerning the placement and relationships of the Mount Carmel finds continued and it was in the 1950s that some new thinking was introduced, especially as seen in the work of Howell. In his early attempts to deal with the Tabun and Skhul remains, he too, saw them as representing a single, highly variable population (Howell, 1951). However, he distinguished them from the classic, more highly specialized, European Neanderthals arguing that the Mount Carmel remains were more generalized anatomically. It was these progressive Neanderthals that were the precursors of both the classic Neanderthals and modern humans. In a later paper Howell (1958) removed the Skhul assemblage, as well as the very similar Qafzeh remains excavated by R. Neuville (which had remained unstudied) from the Neanderthals. He saw these samples as representing an intermediary link between the more generalized Neanderthals of Tabun and modern humans and referred to them as "Proto-Cro-Magnons."

Even with the addition of new samples from other sites, the picture still remains unclear with both camps each viewing the data in accordance with their own hypothesis. Thus, one group sees the assemblage of Middle Paleolithic hominids as representing a single, highly variable population (Arensburg, Belfer-Cohen, 1998; Corruccini, 1992; Kramer, Crumett, Wolpoff, 2001; Kidder, Smith R., Smith F., 1992; Wolpoff, 1992). The other group sees two distinct populations; the remains from Tabun, Amud, and Kebara represent late archaic hominids, specifically the Neanderthals, while those from Skhul and Qafzeh are considered as early representatives of anatomically modern humans (Rak, 1998; Stringer, 1992, 1998; Trinkaus, 1986, 1992; Vandermeersch, 1992, 1997).

It is when considering the chronologies of the remains that questions concerning continuity arise. There are some sites that are relatively well dated with determinations corroborated through the application of several techniques such as thermoluminescence (TL), electron spin resonance (ESR) and uranium series (U-series). One of these is Qafzeh that, at one time, was thought to date relatively late to the Middle Paleolithic sequence, ca 50,000 – 40,000 years ago (Jelinek, 1982; Trinkaus, 1984). The first indication that it may have been considerably older, at least greater than 85,000 years, came from studies of the microfaunal biostragtigraphy (Bar-Yosef, Vandermeersch, 1981; Tchernov, 1988, 1994). Confirmation of a greater antiquity of the Mousterian at this cave has now come from TL, ESR and U-series determinations. The TL dates of burnt flints from Levels XVII through XXIII range from 85,000 to 105,000 years (Valladas et al., 1988). There is no systematic variability with depth when experimental errors are taken into consideration, supporting the geological evidence of very rapid sediment accumulation. The average date for all the layers together is 92,000 ± 5,000. ESR determinations on tooth enamel (Schwarcz et al., 1988) from layers XV to XXI are very close to the TL dates. Here, they range from 73.7 to 119 kyr (EU)*, and between 89.1 to 143 kyr (LU) with respective means of 96 ± 13 kyr and 115 ± 15 kyr. Even though the EU dates overlap the TL dates and the LU determinations are only slightly older, the authors feel that the average, based on the LU model, gives a more reliable age estimate. However, as they state, there is reason to consider a U-uptake history intermediate between the EU and LU profiles, which "would also give ages that overlap the error limits of the TL age" (Schwarcz et al., 1988: 736). Further confirmation of the TL dates, which also tend to support the EU age estimates, was obtained from U-series analyses of two tooth enamel samples taken from Level XIX (McDermott et al., 1993), which were also used in the analysis done by Schwarcz et al. (1988). Comparisons between the ESR and U-series dates are presented in Table 1. It is noteworthy that the 368DE sample provided essentially equivalent U-series and EU ages. For the second sample, the U-series date is slightly younger than that for EU, but it is still within the error for that average. In sum, all three techniques place the Mousterian of Qafzeh at around 92,000 years ago.

Kebara is also an example of which the various dating techniques seem to correlate quite well. The first determinations were made by Valladas et al. (1987)

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* Here and below, EU is for early uptake model and LU is for linear uptake model.

through TL of burnt flints from Layers VI through XII, the lowest of which contained the Neanderthal burial Subsequently, ESR determinations were made on tooth enamel of gazelle teeth from Layer X (Schwarcz et al., 1989). Finally, Porat et al., (1994) applied ESR to burnt flints, the same samples used by Valladas et al. (1987) The results are presented in Table 2.

For the TL dates, Valladas et al. (Ibid) note that there is no systematic variation with depth of Layers X – XII, indicating frequent occupation of the cave around 60,000 years ago. Layer VII is somewhat younger than the underlying layers, but the authors feel, given the errors in the dates, that it can not be stated definitely that there was an occupational hiatus between Layers VIII and VII. In fact, drawing on the stratigraphic evidence from the cave, they argue for a very rapid rate of accumulation from Layers XII to VII Layer VI is quite young in comparison to the other dates and it is possible that the samples dated were in secondary position due to erosion in the cave. Considering the experimental errors of the dates, it is safe to say that the two series of ESR determinations correspond well with the TL dates (Schwarcz et al , 1989; Porat et al., 1994), and that the burial can be dated to approximately 60,000 years ago, and that the Mousterian sequence at this site continues to 50,000 years ago.

Another hominid bearing site that is securely dated is Amud. The first ESR analyses (Grün, Stringer, 1991) yielded dates of 42 ± 3.0 and 41 ± 3.0 ka (EU) and 49 ± 4.0 and 50 ± 4.0 ka (LU) These are somewhat problematic in that the precise provenance of the samples is not known More recently, TL, ESR and U-series determinations have become available (Valladas et al., 1999; Rink et al., 2001). These all place the overall Mousterian sequence of the cave at 70,000 – 53,000 years ago. The younger determination is the date of the adult Neanderthal skeleton recovered from near the top of the sequence (Suzuki, Takai, 1970). The Neanderthal infant (Hovers et al., 1995) recovered at a lower depth is dated to 61,000 years ago.

The two remaining sites have also been dated by several techniques However, the results are less clear-cut than in the previous examples. For Skhul the difficulty is due in part to the fact that the cave fill was completely removed by the original excavators, precluding the possibility of carrying out precise dosimetry The first attempt to date this site was done by Stringer et al. (1989) through ESR of two bovid teeth. The resulting EU dates ranged from 54.6 to 101 ka with an average of 81 ± 15 ka while the LU determinations, between 77.2 to 119 ka averaged 101 ± 12 ka (Table 3). It can be seen in this table that there are some discrepancies between the two teeth, a point that will be returned to below.

Subsequently, six samples of burnt flint were analyzed through TL (Mercier et al., 1993). These produced dates ranging from 99.4 to 166 8 ka, which averaged 119 ± 18 ka and which agree somewhat with the LU model ESR dates. McDermott et al. (1993) analyzed the same two samples studied by Stringer et al., in addition to three other teeth from Layer B. Their results, compared to the ESR determinations, are presented in Table 4. For sample 521, the U-series and EU determinations are in accordance. In addition, the U-series date for sample 522 are considerably younger than those obtained through ESR The duplicated runs of sample 856 match well with the EU estimates, while the two 854 samples are younger than the EU determinations, but not by the same order of magnitude when comparing sample 522. The implication is that there may be some danger in averaging the ESR dates since, as McDermott et al. (1993) argue, it may be that two faunal stages are present at the site. This idea was originally suggested by McCown and Keith (1939), who noted the possibility of some stratigraphic variability between the burials at the site with one group of hominids (III, and VI – X) being earlier than a second group (I, IV and V). On this basis and other archaeological considerations, Ronen (1976) has also argued that the Skhul burials, found within the entire two meters of deposits of Layer B, may span a considerable time.

It seems, then, that at least part of the occupation at Skhul can be dated to 100,000 years ago, or possibly more, near the middle of Oxygen Isotope Stage (OIS) 5 (SPECMAP), but one should not discount the possibility that the cave was utilized at a much later date, perhaps around 50,000 years ago during OIS 4. However, it must be cautioned that the possible existence of two faunal stages at this site does not necessarily indicate two burial phases widely separated in time.

Turning now to Tabun, this site, with its very long sequence (Garrod, Bate, 1937; Jelinek, 1982; Jelinek et al., 1973), is often used as the key site for drawing correlations. Its chronology is of critical importance, but unfortunately it is proving to be the most difficult to date, as the various techniques do not always provide corroborating determinations. Determinations were first made through ESR (Grün, Stringer, Schwarcz, 1991) and the results for the Mousterian levels of the cave are presented in Table 5. While there are considerable differences between the LU and EU dates (the former are anywhere from 17 to 20 % older than the latter), the LU determinations are considered to be the more reliable

Table 1. Comparisons of U-series and ESR dates (kyr) from Qafzeh, Layer XIX (after (McDermott et al., 1993))

Sample	U-series	ESR	
		EU	LU
371EN	88.6 ± 3.2	103 ± 19	125 ± 22
368DE	106 ± 2.4	105 ± 02	115 ± 08

Table 2. Radiometric age (kyr) determinations for Kebara (after (Porat et al., 1994))

Level	TL	ESR	
	Burnt flint	Burnt flint	Tooth enamel
VI	48.3 ± 3.5	53.9 ± 4.6	–
VII	51.9 ± 3.4	66.7 ± 6.0	–
VIII	57.3 ± 4.0	58.2 ± 5.4	–
IX	58.4 ± 4.0	–	–
X	61.6 ± 3.6	–	60 ± 6.0 (EU) 64 ± 6.0 (LU)
XI	60 ± 3.5	65.1 ± 5.1	–
XII	59.5 ± 3.5	58.9 ± 5.5	–

Note. Ages are averages for each level

Table 3. Early uptake and linear uptake ESR ages (kyr) for Skhul, Layer B (after (Stringer et al., 1989))

Sample	EU	LU
521a	88.1 ± 17.9	102.0 ± 22.7
521b	86.1 ± 13.1	102.0 ± 18.1
521c	94.9 ± 15.6	109.0 ± 20.5
521d	101.0 ± 19.0	119.0 ± 25.1
522a	68.0 ± 5.4	98.3 ± 10.6
522b	73.0 ± 7.0	99.9 ± 12.4
522c	54.6 ± 10.3	77.2 ± 15.7
Average	81 ± 15	101 ± 12

Table 4. Comparisons of U-series and ESR dates (kyr) from Skhul, Layer B (after (McDermott et al., 1993))

Sample	U-series	ESR	
		EU	LU
521DE	80.3 ± 0.6	88 ± 13	102 ± 18
522EN	40.4 ± 0.2	68 ± 0.5	98 ± 11
854DE	41.4 ± 0.4	55 ± 0.5	65 ± 0.5
854EN	43.0 ± 0.5	55 ± 0.5	65 ± 0.5
856DE(1)	43.5 ± 0.1	46 ± 0.5	66 ± 0.5
856DE(2)	45.5 ± 0.7	46 ± 0.5	66 ± 0.5

estimates in this particular study. McDermott et al. (1993) suggest that it is the EU dates, which most likely represent the true ages of the various levels. This is based on what they see as a strong correlation between their U-series dates and those based on the early uptake ESR dates (Table 6). According to these authors, the dates of the samples from Layers C and D are well within the error ranges for the ESR determinations based on EU. They offer no explanation for the discrepancy in the Layer B dates.

Also shown in Table 5 are recently revised ESR and combined U-series/ESR determinations made by Grün and Stringer (2000). These are considerably older than their previously published dates, and the authors feel that these are more reliable. On the basis of their argument that the best age estimate for Layer B is the LU-ESR date (122 ± 16 ka), the Mousterian sequence of Tabun would begin early in OIS 7 and continue to OIS 5e.

Additional determinations have been provided by Mercier et al. (1995), who have dated the Tabun sequence with TL of burnt flints. The resulting dates vary considerably from those provided through other means (Table 7). The dates are shown in this table, with regard to Jelinek's stratigraphic column and their correlations to the Garrod's layers. These dates are exceptionally older than any of those determined by ESR or U-series and essentially push the beginning of the Mousterian sequence from Layer D into OIS 8 with Layer C falling toward the end of OIS 7.

More recently, an attempt was made to directly date the Tabun I skeleton (Schwarcz, Simpson, Stringer, 1998) through U-series from samples extracted from its left femur and mandible. While the two elements gave very conflicting results, the authors argue that the skeleton dates to 34,000 ± 5000 years ago. This has been strongly criticized on archaeological (Alperson et al., 2000) and methodological grounds (Grün, Stringer, 2000; Millard, Pike, 1999). Grün and Stringer, through additional ESR determinations of a tooth fragment from the same skeleton, concluded that its apparent ages are 112 ± 29 ka (EU) and 143 ± 37 ka (LU) placing it relatively early in OIS 5 or late in OIS 6.

In addition to the lack of resolution in dating Tabun, the provenance of the hominid remains from this site is also a matter of debate. The finds from Layer C of the cave (McCown, Keith, 1939) include the Tabun I partial female skeleton, the Tabun II complete mandible, a femoral shaft (Tabun III) and wrist and hand bones (Tabun IV – VI). The debate centers on the Tabun I skeleton, and not on its recognition as a Neanderthal, but rather with regard to its stratigraphic placement. Garrod (Garrod, Bate, 1937) assigned it to Layer C but stated that, because it was near the top of the layer, it could well be intrusive from the overlying Layer B, an interpretation most recently presented by Bar-Yosef and

Table 5 Original and revised average ESR ages (kyr) for Mousterian layers of Tabun Cave

Layer	(Grun, Stringer, Schwarcz, 1991)		(Grun, Stringer, 2000)		
	EU	LU	EU	LU	US/ESR
B	86 ± 11	103 ± 16	102 ± 17	122 ± 16	104^{+33}_{-18}
C	102 ± 17	119 ± 11	120 ± 16	140 ± 21	135^{+60}_{-30}
D	122 ± 20	166 ± 20	133 ± 13	203 ± 26	143^{+41}_{-28}

Table 6 Comparison of U-series and ESR dates (kyr) from Tabun Cave (after (McDermott et al., 1993))

Layer/ sample	U-series	ESR	
		EU	LU
B/550DE	50.7 ± 2.3	76 ± 14	85 ± 18
C/552DE	105.4 ± 2.5	111 ± 30	113 ± 31
C/551DE	101.7 ± 1.3	121 ± 29	134 ± 36
	97.8 ± 0.4	121 ± 29	134 ± 36
D/556EN	110.7 ± 0.9	93 ± 12	152 ± 24

Table 7 Average TL dates for Mousterian levels at Tabun Cave (after (Mercier et al., 1995))

Unit*	Layers**	Age (kyr)
I	C	171 ± 17
II	D/C	212 ± 22
V	D/C	244 ± 28
IX	D	263 ± 27

*After (Jelinek, 1982, Jelinek et al., 1973)
**After (Garrod, Bate, 1937)

Callander (1999). Jelinek (Jelinek et al., 1973) has argued that this same skeleton could have originated in Layer D. His thinking was based on the fact that the Skhul lithic assemblage was similar to that from Layer C of Tabun. Since the former was associated with anatomically modern humans, and on the assumption that Neanderthals preceded anatomically modern humans, Tabun I must predate both the Skhul and Layer C assemblages. Historically, then, this particular find has been moving within the Mousterian sequence of the cave. A possible solution has been offered by Trinkaus (1993a), who has examined the right hand and wrist bones, Tabun IV – VI. In that they are essentially mirror-images of the same left hand bones from Tabun I, the indication is very strong that the skeleton does, indeed, belong to Layer C.

The Tabun II mandible is also controversial In this case, there is no argument regarding its provenance, and it definitely belongs to Layer C. However, there are those (McCown, Keith, 1939; Stefan, Trinkaus, 1998; Trinkaus, 1983, 1987, 1993a) who see this specimen as representing a Neanderthal, while others (Quam, Smith, 1998; Rak, 1998) argue that it more closely resembles the Skhul/ Qafzeh hominids and should be classified with them. Also, there is no debate concerning the location of the femoral shaft that is quite definitely that of a Neanderthal (Trinkaus, 1976). More recently, a premolar, with typical Neanderthal features, has been reported from this same layer (Jelinek, 1992).

Considering the femur, the tooth, and more significantly Trinkaus' arguments, there is no doubt that Neanderthals are definitely associated with a Type C assemblage. This would be true even if the Tabun I skeleton does indeed belong to Layer B. The uncertainty regarding the taxonomic placement of the mandible presents another dilemma. Classifying it as that of a Neanderthal would add further confirmation of the presence ofNeanderthals in Layer C. If, on the other hand, it does represent an anatomically modern human, there would be a strong argument for contemporaneity between the two populations. If this is the case, then Tabun would be the only instance in which the two types of hominids occur together within a Mousterian context. In all other sites, only one or the other is present. Finally, it is worth noting that, according to Garrod's (Garrod, Bate, 1937) description, the mandible is some 85 cm below the skeleton. While this would make the mandible older, it is not likely that there is a great difference in their ages, given the available radiometric dates

Following these hominids associated with the Middle Paleolithic, there are only a few finds that are within an Upper Paleolithic context. Probably, the earliest of these is "Egbert" (Ewing, 1947), an anatomically modern child attributed to the early Upper Paleolithic of Ksar Akil dating to perhaps as early as 37,000 years ago (Bergman, Stringer, 1989). There are also fragmentary remains from the Upper Paleolithic of Qafzeh, preliminarily dated to ca 30,000 years ago (Bar-Yosef, 2000).

The gap

There are several important observations to be made from the review presented above. First, on the assumption that the Levantine assemblage consists of two distinct groups, those regarded as early representatives of anatomically modern humans are, for the most part, restricted to a relatively short span of time during OIS 5. The Neanderthals, on the other hand, are found for the most part, in OIS 4 as at the sites of Amud and Kebara. The exception here is that even if the Tabun I skeleton does belong to Layer B, most of the date determinations would place it in OIS 5, as would be true for the other Neanderthal remains from Layer C.

The problem lies in the fact that, between the Middle Paleolithic anatomically modern humans and those of the subsequent Upper Paleolithic, there is a chronological gap of some 70,000 years. Stringer (1989) and Vandermeersch (1981) argue that there are very strong morphological and metric similarities between the Skhul/Qafzeh group and early Upper Paleolithic humans of Europe However, as Vandermeersch (1997) later noted, there is also a geographic gap between the two regions in addition to the chronological gap. He notes that this bioanthropological void "can only be filled in the Near East" (Vandermeersch, 1997: 111). The difficulty here is that, to date, there are virtually no specimens (because of scarcity and poor preservation) from the early Levantine Upper Paleolithic to which possible links can be made. In addition, the gap is filled only by the Neanderthals of OIS 4. The latest of these, from Amud, most likely dates to approximately 53,000 years. While this narrows the gap somewhat, it still spans some 20,000 years.

There is also another possible way to slightly narrow the gap between the Skhul/Qafzeh hominids and later modern humans. This is based on the observation (McCown, Keith, 1939) that the Skhul burials III and VI – X were stratigraphically earlier than burials I, IV and V. The possibility that two burial phases are present may be supported by dates reported from this site by McDermott et al. (1993), indicating that some of the samples may date to early in OIS 5, while others fall at around 50,000 years ago, thus reducing the gap between the latest of the Skhul/Qafzeh group and the earliest Upper Paleolithic remains from the Levant to only some 15,000 years. This would make the possibility of continuity more plausible, and in this context, it would be expected that the later hominids from Skhul should be somewhat more "modern" in character in comparison to their predecessors. Ronen (1976), in citing the work of Thoma (1957, 1958), argues that this is, indeed, the case with burials I – V being more modern in character and burials VI – IX being more similar to the Tabun C Neanderthal. However, Corruccini (1992), working with metric cranial variables, and Kramer et al. (2001), analyzing non-metric cranial features, show that Skhul IV and IX, from two different stratigraphic positions, are the most Neanderthal-like; a result that is in contradiction to the above expectation This lack of stratigraphic correlation, together with the cautionary note given above regarding the dates, negates the existence of two burial phases at this site.

Another issue relating to the Skhul/Qafzeh hominids as a separate group is the fact that, in addition to their being restricted in time, they are also found only in the Levant and in Africa. No contemporary counterparts are found in other regions during OIS 5, and the only hominid remains found within this period are those attributed to the Neanderthals. Further, while the two groups may be at least partially contemporaneous in the Levant, it is the Neanderthals that potentially fill the gap and apparently displace the anatomically modern hominids. Taken together, this may indicate that the Skhul/Qafzeh group and their African counterparts were a geographically and temporally bounded species that, for yet unknown reasons, did not enter into more northern latitudes. Might it be said that, in the Levant they met their demise at the hands of the Neanderthals as recently proposed by Shea (2001; in press (a, b))?

Similar difficulties arise when viewing the Middle Paleolithic hominids as representing a single, highly variable population. These difficulties are found in studies comparing the remains from Tabun and Amud to those from Skhul and Qafzeh, and demonstrate that these two groups are more similar to each other than either is to European Upper Paleolithic hominids (Corruccini, 1992; Kramer, Crummett, Wolpoff, 2001). The latter study, in particular, while clearly distinguishing between European Neanderthals and Upper Paleolithic humans of the same region through comparisons of non-metric cranial traits, found that these same traits did not separate the Levantine Neanderthals from their anatomically modern counterparts. The fact that the Levantine hominids are more similar to each other than they are to Upper Paleolithic humans would indicate that this population was not ancestral to later entities. Under this scenario, too, the hominids of the Levantine Middle Paleolithic may simply have come to an end somewhere around 50,000 years ago and failed to contribute to the evolution of modern humans.

Conclusion

In summary, the multiregionalists view the Levantine hominid assemblage as consisting of a single, variable population while adherents of the "Out of Africa" model see two distinct populations. The chronological gap described here, rather than resolving the issues, has added another complicating factor that requires closer scrutiny This gap is seen here as of great significance and may invalidate both of the possibilities presented above. If this is the case, then it remains to be known what happened to the Middle Paleolithic hominids of the Levant and who, if any, were their progeny. It could very well be that anatomically modern *Homo sapiens sapiens* are the descendents of another as yet unknown ancestor entirely.

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ROCK ART ON THE ROCKS; ROCK ART OFF THE ROCKS: IRON AGE PETROGLYPHIC IMAGES AND AGRICULTURAL SOCIETIES IN XINJIANG AND BACTRIA

Introduction

It was noticed long ago that the art of steppes of the Iron Age was represented not only in metal, wood and textiles, but also on rocks. The petroglyphs of Central Asia provide a huge corpus of images among which a good number find parallels on other materials, in the same style. However, the characteristics of the two corpuses (rock images and images on other materials) do not exactly coincide. The stylistic and chronological sequence derived from rock art is not precisely the material and chronological cultural sequence inferred from excavations of tombs. The corpus of rock images is in many respects larger and richer in iconography than the other materials, especially for the early periods. This is partly because of the disappearing of perishable materials. On the other hand, in the Pazyryk Culture, the corpus of images on other materials is richer. Only a small part of the Pazyryk art style is represented in rock art (Kubarev, 1999). Kubarev has identified the following iconographic elements: deer and elk images, horse and horsemen, leopard, wild boar, moufflon, bird with extended wings, sitting bird, fish, and scenes of predation. This is due in part, to the relatively short duration of the Pazyryk Culture and to the relatively small territorial extension of this culture. For example, the westernmost extension of the Pazyryk style in rock art appears at Eshkeolmes (Jungarian Alatau) and the westernmost manisfestation of the deer stylised with a long bird beak is seen at Bayan Jurek (western Kazakhstan) (Samashev, 2001).

However, we have to take into consideration that the intention of rock image-makers was not the same as the intention of metal casters, textile weavers and embroiders, or wood cutters. Rock art (and stelae such as deer stones) is located in a spatial environment, and is designed to attract attention, or to be used for special purposes during specific occasions. Similarly, the purpose of other arts was the decoration of humans or of horses. Dwellings were probably decorated as well (e.g., Pazyryk wall hangings). Technical aspects also had a great impact on similarities and differences between rock art and other arts. For example, it would have been extremely difficult to carve the rock for obtaining designs similar to the fine complex multicolored patterns of embroidery on a woman's dress found at Pazyryk-2.

The purpose of this paper is to point out some of the art representations from Xinjiang and Bactria, where evidence of rock art appears as a mark of the steppe populations' connections with agricultural societies.

Populations defined by various archaeological cultures, occupied Xinjiang during the middle and beginning of the second half of the 1st millennium BC (Debaine-Francfort, 1988, 1989). Western Taklamakan populations are known due to the discoveries at Zaghunluk and Djoumboulak-Koum. Zaghunluk is a cemetery located near Charchan (Qiemo) (He Dexiu, 1998; Kamberi, 1994), and Djoumboulak-Koum is a fortified settlement located in the dried up valley of the Keriya River, in the middle of the desert (Debaine-Francfort, 2001a, b).

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The settlers of Djoumboulak-Koum were sedentary, cultivating cereals by irrigation. Their dwellings were large houses, and storage pits were used. Female and male clothing (skirts, trousers, tunics) was quite close to that of the Pazyryk Culture, known due to the discoveries and studies of Russian archaeologists (Fenomen..., 2000; Polosmak, 2001). Cemeteries surrounding Djoumboulak-Koum were studied by the Sino-French Keriya Expedition. The Zaghunluk cemetery contained individual and collective burials. Many other minor sites were discovered as well. Huge quantities of organic materials, well preserved due to arid conditions, have been found during the excavations of these sites. Many finds show artistic features that can be related to steppe art. The question of the ethno-linguistic affiliation of the populations of these sites will not be discussed here. We shall select only the images carved in wood and put them in perspective with petroglyphs. The relevance of metal and textile ornamentation is very important, but due to the space limitation of this article, we choose to concentrate on woodcarving, which is technically closer to the petroglyph stone carvings. Woodcarving appears on various objects of daily use, as we shall further see.

In the period under consideration, Bactria was under Achaemenid and then Greek rule. Bactria (defined as northern Afghanistan and southern Tajikistan and Uzbekistan) is not far from Xinjiang via the Kashgar, Yarkand, and Pamir road. During the period considered here, the Pamir Saka, nomadic tribes, herded their livestock on the high mountain pastures in Pamir-Karakorum area (Litvinskiy, 1972). The agricultural prosperity of Bactria is well known, resting upon irrigation agriculture and an urbanized population living in large city centres. No tomb is known from the Achaemenid period, probably because of defleshing rituals, typical of the Zoroastrian religion. However, as soon as the Greeks arrived, burial and cremation rituals were performed anew. Art of Achaemenid and Hellenistic Bactria is know by the excavations of towns and by some chance discoveries, not to mention burials, looted by unofficial diggings. We shall mainly mention here some of the discoveries made by the French Archaeological Delegation at Ai Khanoum in Afghanistan (early 3rd – late 2nd century BC) (Francfort, 1984; Guillaume, Rougeulle, 1987) and by the Tadjik-Russian Expedition at Takht-i Sangin in Tadjikistan (Litvinskiy, 2000; Litvinskiy, Pichikyan, 1994, 1995; Pitschikyan, 1992), as well as the renown Treasure of the Oxus (Artamonov, 1973; Barnett, 1968; Dalton, 1964; Dvurechenskaya, 1996; Kuz'mina, 1977, 1979; Staviskiy, 1977; Zeymal, 1979), and the recently discovered so-called "Second Oxus" hoard (Pichikyan, 1997). Our main focus will not be the typical Achaemenid court art, nor the pure Hellenistic art and not even the genuine steppe art of metal ornaments, but the art of local stone-cutters. It is not the great art of the architectural decoration or monumental sculpture, but the stonecutting for the decoration of small objects. Again, the relationship with the petroglyphs will be demonstrated.

Taklamakan (Xinjiang) woodcarving and petroglyphs

In Xinjiang, petroglyphs are abundant in the Chinese part of the Altai; they are less numerous in the Tien Shan, and, at the present stage of research, not so common in the Kunlun (Francfort, 1994, Su Beihai, 1994; Wang Binghua, 1988; Wang Bo et al., 1998; Wang Mingzhe, 1986; Zhao Yangfeng, 1987).

Deer images (Fig. 1 – 3). Deer images appear on buckets from Zaghunluk with typical stylistic features (antlers on the back, two legs only) (Francfort, 2001: fig. 17, 21). Interesting, symmetrically positioned deer with twisted hindquarters are carved on a comb from the same site (Ibid.: fig. 4). At Djoumboulak-Koum a deer image is carved on a wooden dish (Debaine-Francfort, 2001a: 172). All these deer are carved in a linear style very close to the petroglyphic images from Kazakhstan: Tamgaly (Mar'jashev, Gorjachev, Potapov, 1998: plate 23, fig. 46), Maiemir (Marsadolov et al., 1998; Samashev, 1992: fig. 64, *2 – 16*; 175, *13*, *19 – 22*, 176, *15*), and the Altai (Kubarev, 1999). The composition of symmetrical deer images with twisted hindquarters is unknown in rock art, but common on belt plaques and diadem ornaments (Francfort, 2001: 47).

Elk images (Fig. 4). An elk image in a very curled form is carved on a spindle whorl from Zaghunluk (Gong Guoqiang, Qin Dahai, 1997: 27, fig.7, *8*, plates 4, 6; Francfort, 2001: fig. 26, 27). Similar curled elk images are not known in petroglyphs, but the way of representing the head, muzzle, nose and ears, is typical of the petroglyphs from very early times in Siberian art (e.g., Tomskaya Pisanitsa, Shalabolino, Sukhanikha, the Altai (Sher, 1980: fig. 101; Kilunovskaya et al., 2000)). Similar elk images are present on artifacts from the Iron Age sites of Tuva, Kazakhstan, and the Altai (Barkova, 1984; The Altai Culture, 1995; Kubarev, 1999: 98).

Horse images (Fig. 5). A spindle whorl from Zaghunluk depicts, schematically, a horse with reverted hindquarters (Francfort, 2001: fig. 23). Few horses with twisted hindquarters are represented in rock art (Kubarev, 1999: plate IV, *13*) and also known on artifacts found in the area stretching from Aksu to Issyk.

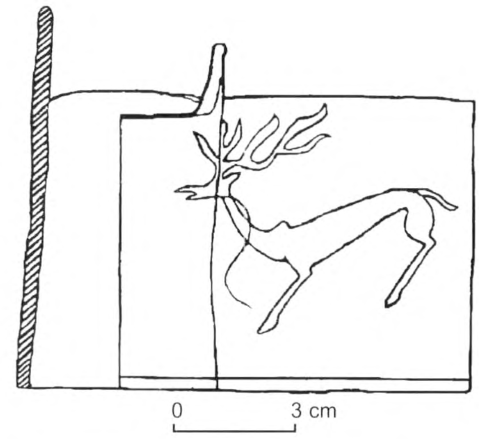

Fig. 1. Deer on a wooden vessel. Zaghunluk (Xinjiang).

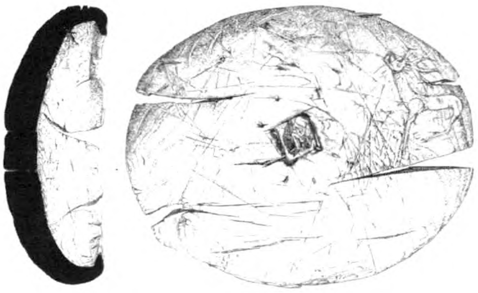

Fig. 3. Deer on a wooden plate. Djoumboulak-Koum (Xinjiang).

Predation scene: wolf and wild sheep (Fig. 6). A predation scene, represented on a comb from Zaghunluk (Keyom, 2000: 416), is a very common composition in steppe art; it is also well known in numerous variants in petroglyphs (Kubarev, 1999: plate VI, *4 – 17*). Wolf images very similar to the Zaghunluk comb are widespread in rock art of South Siberia (e.g., Ust-Tuba (Sher, 1995: plate 58) and Kirghizstan (Zhaltyrak-Tash)). Wild sheep representations are more common in Kazakhstan (Khantau etc.) than in Siberia, where the wild goat (*Capra ibex sibirica*) dominates. Wild sheep are numerous, sometimes in rows or flocks as represented on a comb (Barkova, 1984).

The animals (a wild sheep and a wolf) and the composition (predation) are known from artifacts representing steppe art (Kubarev, 1999; Polosmak, 1995; 2000) and also from Djoumboulak-Koum in Xinjiang (Debaine-Francfort, 2001a: 167; Francfort, 2001: fig. 13) (a wolf attacking a moufflon).

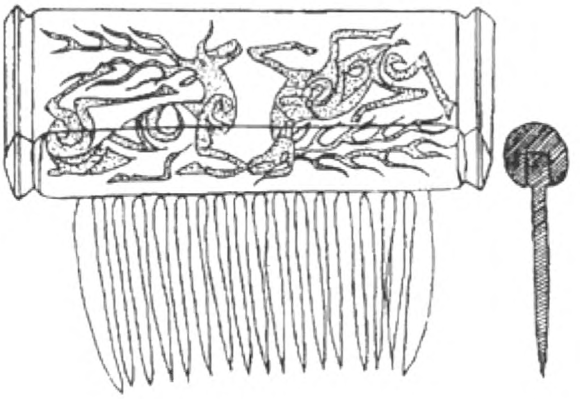

Fig. 2. Deer on a wooden comb. Zaghunluk (Xinjiang).

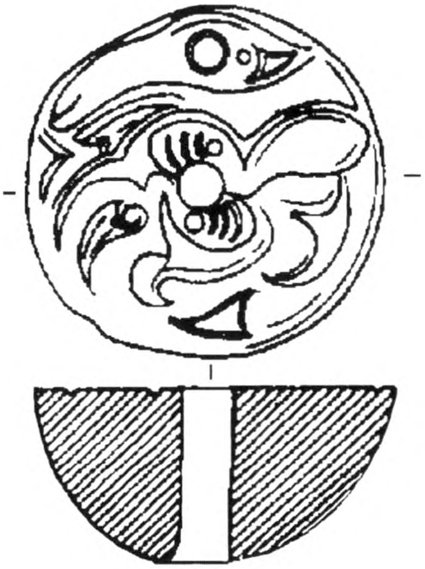

Fig. 4. Elk on a wooden spindle whorl. Zaghunluk (Xinjiang).

Camel fighting (Fig. 7, 8). This scene finds exact analogies not only in ornaments (Korolkova, 1999), but also in rock art of Kazakhstan (Kadyrbaev, Mariashev, 1977: fig. 53, p. 103; fig. 79, p. 128) (Fig. 9). All details of the camels are similar: hair on the head, legs, high humps, etc.

Stylistic traits. Not only themes and motives, but also the way of representing the animals is similar in woodcarving and in rock art. For example:

a) details are common: muscle representations by curved lines, deer antlers on the back, linear treatment of animal body are similar to the petroglyphs;

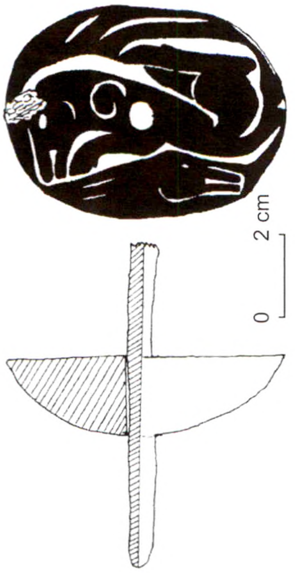

Fig. 5. Horse on a wooden spindle whorl. Zaghunluk (Xinjiang).

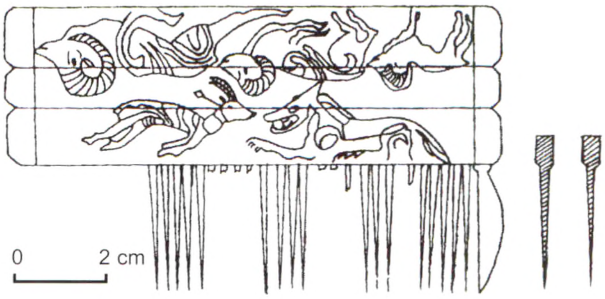

Fig. 6. Wolf and moufflons on a wooden comb. Zaghunluk (Xinjiang).

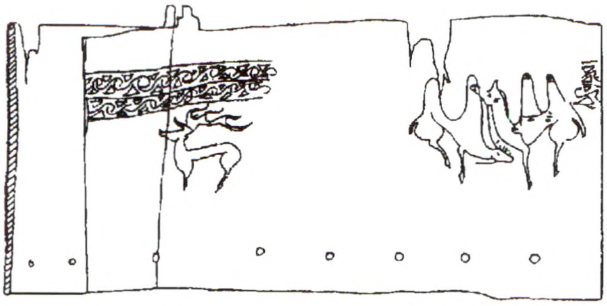

Fig. 7. Camels on a wooden vessel. Zaghunluk (Xinjiang).

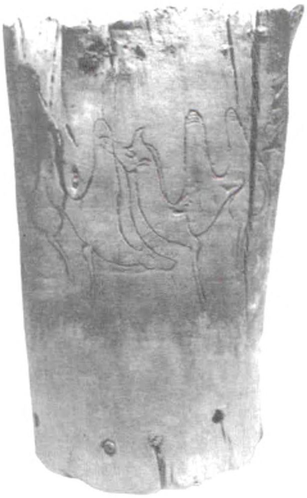

Fig. 8. Camels on a wooden vessel. Zaghunluk (Xinjiang).

b) twisted hindquarters is typical of the eastern part of Central Asia, especially of the Altai and Tien Shan; the same stylistic element was recorded in the Pazyryk Culture;

c) binary compositions: camels fighting and predation of other animals; the first one belongs to the Kazakhstan variant of steppe art (also the frieze composed of wild sheep), while the second is widely spread in the steppe zone of eastern Central Asia.

Function of objects and semantics of images. We may consider that, here, we face a sort of iconographic and stylistic *koinè* (Francfort, 2001). The similarity of the images and style indicates that a common artistic entity was spread from the steppes to the Taklamakan, on various types of materials (rock and wood).

The images of Taklamakan ornate objects of daily use: buckets, combs, and spindle whorls. Are they objects of the feminine domain? It is difficult to assert, but not impossible. The main point is that they appear on common artifacts and do not appear on corporal ornaments, prestige, precious or ritual objects. Therefore, the images do not bear any heavy symbolic charge and must be considered as decorative. In spite of that, it is clear that they belong to a large domain of shared iconographic and stylistic elements. In a flat alluvial domain like the Keriya fan and delta, and in an agricultural sedentary society, these images don't necessarily have the same meaning as the petroglyphs, widespread on the rocky outcrops of the northern areas inhabited by nomad pastoralists. The Zhaghunluk and Djoumboulak-Koum agriculturalists did not wear metallic belt plaques or sophisticated heavily adorned hair dresses, but they did use richly decorated horse harnesses. They lived far away from rock surfaces. They had to use a part of their artifacts

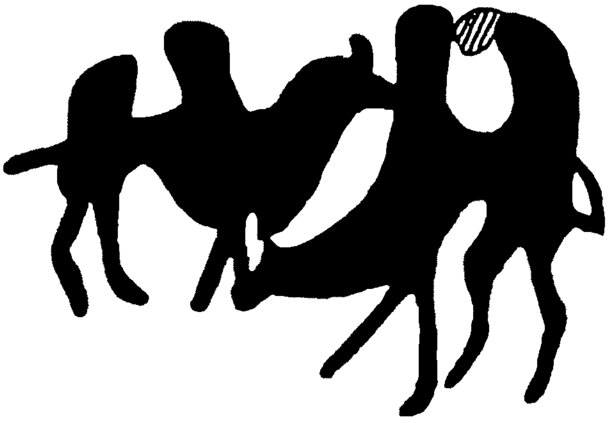

Fig 9 Camels on a rock surface. Arpausen (Kazakhstan).

as material for artistic representations, exactly as did the steppe nomads of Pazyryk, Tuva, Ulangom and other cultures who engraved a certain number of images on mirrors, vessels and other objects of common use that were not usually systematically decorated

Bactrian stonecutting and petroglyphs

Only a relatively small amount of petroglyphic sites are known in the areas of southern Uzbekistan and Tajikistan, and not a single one from Afghan Bactria Similarly, the Pamir is not immensely rich in rock art; but in the vicinity of eastern Bactria, rock art comparative material also includes the rich Upper Indus valley finds.

Stone lids (Fig. 10, 11). These objects are very specific examples of the production of the Bactrian stone cutters of Ai Khanoum. They covered stone *pyxides*, and are considered to be the ancestors of Buddhist reliquaries of the Kushan period (Francfort, 1976). These lids bear decorations: either incrustation of colour tablets or incised motives of geometric pseudo-naturalistic kind, or representing animals or humans. All motives are made in a technique of oblique cutting with cuneiform incisions. Animals are normally represented by horses and moufflons, forming a frieze around the central knob, interrupted by geometric patterns or incrustations. The moufflons turn their heads to the back, the horns are unfolded, and one of the two forelegs is bent. They look as if they are galloping. The mane of the horse is made of a row of sharp cuneiform incisions separated at the neck. Both representations use the technique of small untreated patches. These features are clearly seen on two rock images from the Upper Indus valley, dated from the middle of the 1st millennium (Fig. 12, 13) (Jettmar, Thewalt, 1987: 18, photo 5, plate 4).* The image of the moufflon finds, to some extent, parallels in seals from Persepolis treasury, but differentiates from the royal series. Seals from Ai Khanoum exhibit precisely similar features as well (Guillaume, Rougeulle, 1987: plate 27, *5*). On a seal from a private collection, said to have come from Bactria, a winged and horned animal (a horse?) adopts the same posture as the horses in the petroglyphs of the Upper Indus with one foreleg bent (Fig. 14) (Sarianidi, 1998: fig. 1399).

Stamp seals. A very small number of seals come from Ai Khanoum. If we except a classical chalcedony scaraboid of Greco-Persian style representing a dog and a Ptolemaic or Seleucid type of amethyst with the portrait of a princess (Francfort, 1984, plate XXXV), the remaining seals do not belong to these categories of prestigious court glyptic. The stone is common schist or limestone, and the pictures are schematic.

Horse (Fig. 15) (Guillaume, Rougeulle, 1987. plate 27, *5*; plate 24, *12*). The pyramidal rectangular seal is incised with three signs on its side The face represents a prancing horse and two curved signs. The horse is represented with four legs and a long tail. Over all, the detached mane is made by a line and cuneiform incisions All recall the stone lid's decorations seen above: if not made by the same hand, at least in the same workshop. It should be noted that a seal from an unknown Bactrian site depicts a prancing horse in the same style and manner (Sarianidi, 1998: fig. 1373, *2*). The other side bears the depiction of a winged monster, a sort of dragon.

Monster (Fig. 16). Another seal from Ai Khanoum, conical in shape, depicts a reclining monster, of the feline family, winged and with antlers (Guillaume, Rougeulle, 1987: plates 24, *8*; 20, *4*). Two very similar representations from Bactria are in a private collection (Sarianidi, 1998: fig. 1369, 1370) (Fig. 17). The foreleg is up and the antler tips represented by cuneiform incisions. No exact parallels of these monsters are known in the petroglyphs. This is an adaptation of a Middle Eastern image, probably a sphinx, transposed with the stylistic rules of stonecutting applied in rock art, as well as in popular Bactrian art. The "linear cuneiform style" is either derived from rock art, or is common to rock art, stonecutting, and woodcutting. The small size of the seals and the lids is an element to consider too: fine lines and cuneiform incisions are perfectly adapted. This style is applied to objects of local origin (lids) or objects adopted from the Achaemenid milieu (cylinder seals,

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* The "horse" on p 18 is taken as a late copy, but the Ai Khanoum engravings of horses, moufflons, and other stylistic elements are consistent with an earlier date

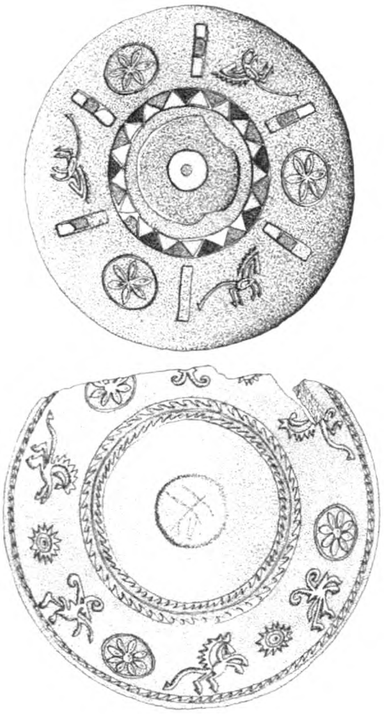

Fig. 10. Horses and moufflons on a stone lid. Ai Khanoum (Afghanistan).

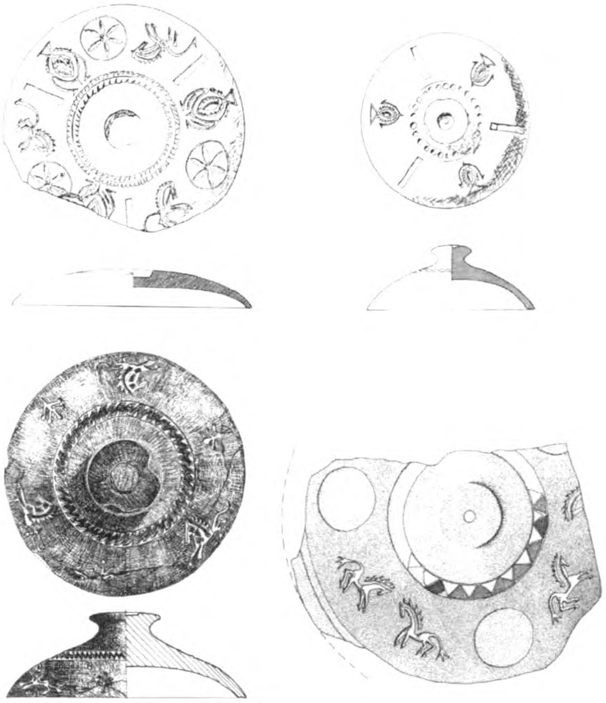

Fig. 11. Horses on a stone lid. Ai Khanoum (Afghanistan).

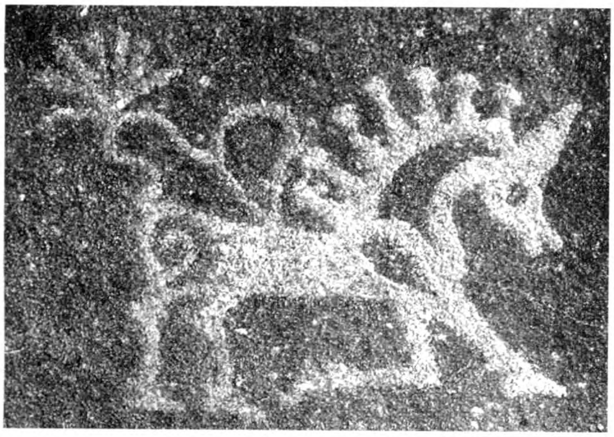

Fig. 12. Horse on a rock surface. Thalpan (Pakistan).

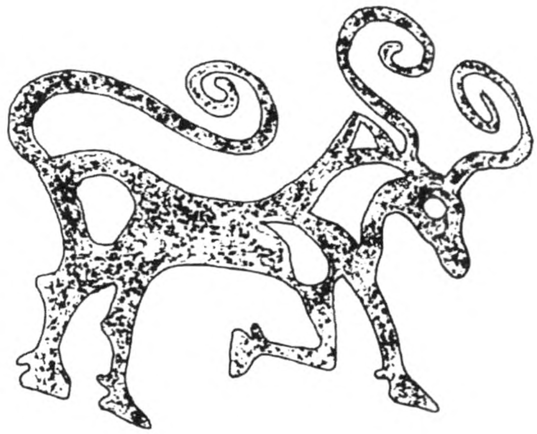

Fig. 13. Mythical horse on a rock surface. Thalpan (Pakistan).

pyramidal or conical stamp seals). This question will be addressed below, but the feline image will illustrate this important point.

Cylinder seal (Fig. 18). A fragment of a cylinder seal from Ai Khanoum represents a rampant feline, a tiger according to the stripes (Guillaume, Rougeulle, 1987: plates 24, *3*; 20, *7*). The four legs are represented with long claws, the tail curls above the back, the open mouth resembles a beak, and the eye is round and pointed. It could have been a version of a royal

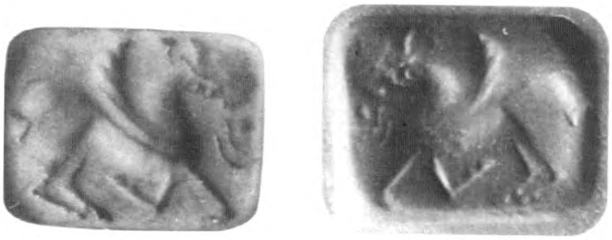

Fig. 14. Mythical horse on a stone seal. Bactria (Afghanistan).

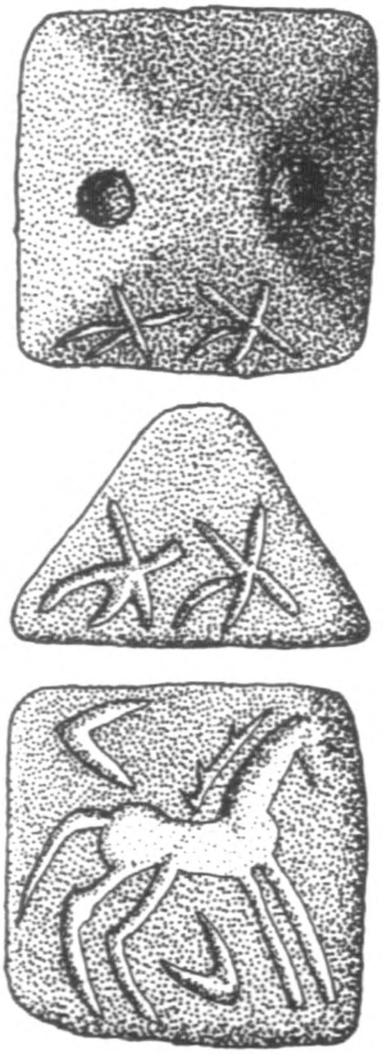

Fig. 15. Horse on a stone seal. Ai Khanoum (Afghanistan).

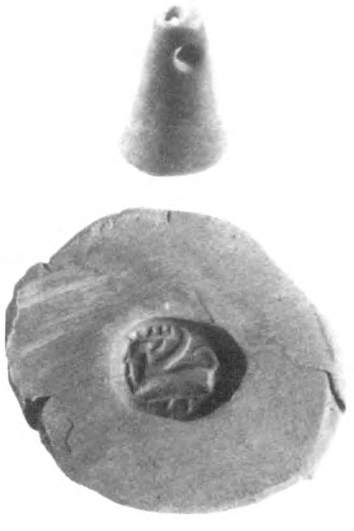

Fig. 16. Sphinx on a stone seal. Ai Khanoum (Afghanistan).

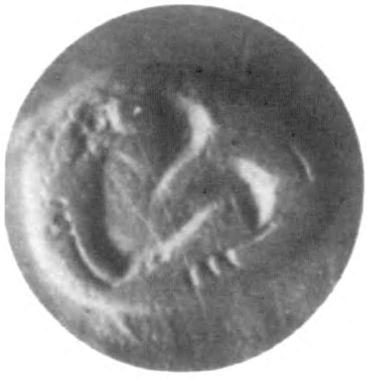

Fig. 17. Sphinx on a stone seal. Bactria (Afghanistan).

hero fighting the monster (but why a tiger in this case?), or a predation scene, or simply a tiger. The style of this tiger is the style of the steppe leopards' images as seen in rock art and on deer stelae in Mongolia, Siberia and Kazakhstan, and also on artifacts (Novgorodova, 1984: 98, fig. 37; Francfort, 1992) (Fig. 19, 20). However, one feline image on a Bactrian seal in a private collection has the same stylistic steppe features (Sarianidi, 1998: fig. 1377) (Fig. 21).

Another conical seal from the same collection depicts a curled feline, one of the most studied, if not popular, motive of steppe art (Fig. 22): petroglyphs, deer stones, and arifacts made of metal and other materials may represent curling felines (see recent articles on the subject (Kisel, 1994 ; Marazov, 2000 ; Polidovich, 2001)). In Bactria, we see steppe art adapted to objects of obvious Middle Eastern origin. What better illustration than a stamp or a cylinder seal carved with an image of steppe art could make this point? The Bactrian stone cutters were combining different artistic traditions. Also noteworthy: two wolf heads in the steppic tradition have been found at Takht-i Sangin, one made of bronze and another of yellow soapstone (Zeymal, 1985: fig. 225, 214) with typical colour stone inlays and stylisation in the same manner as the Ai Khanoum stonecuttings.

Function of objects and semantics of images. In Bactria, we again encounter the iconographic and stylistic features identified above *a propos* from Xinjiang: eye and beak motive, curled animal, horns' position, antler's shape, composition of predation, sharp claws, untreated patches on the neck, shoulders and back.

With the stone lids and seals from Bactria, we enter the domain of local popular art, different from the

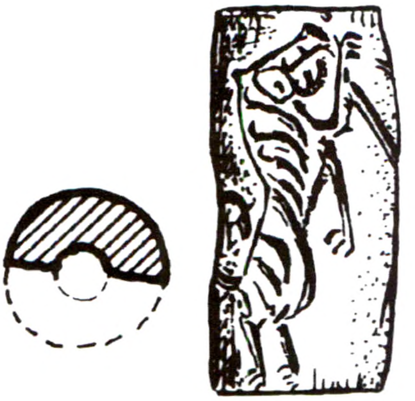

Fig. 18. Tiger on a stone cylinder seal. Ai Khanoum (Afghanistan).

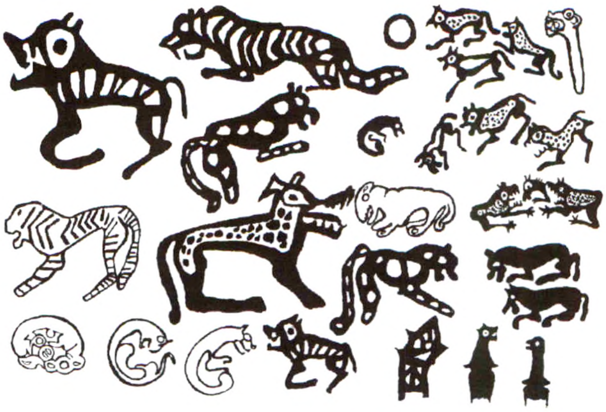

Fig. 19. Felines on rock surfaces and deer stones. Central Asia.

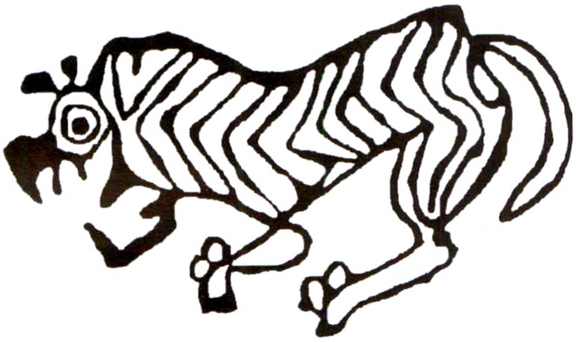

Fig. 20. Tiger on a rock surface. Yinshan (China).

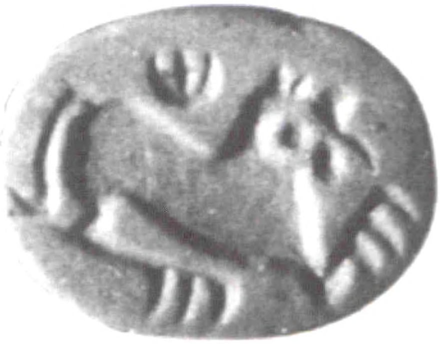

Fig. 21. Feline on a stone seal. Bactria (Afghanistan).

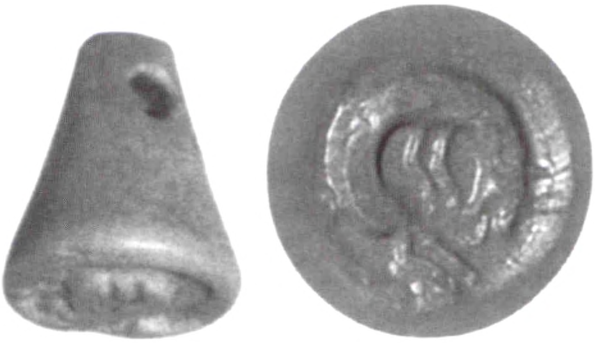

Fig. 22. Curled feline on a stone seal. Bactria (Afghanistan).

court arts, whether Achaemenian or Greek, and different from the "regular" steppe art. The decorated objects can be either purely local, such as the *pyxides'* lids, or adapted from the Persian Empire, such as the cylinder seal and pyramidal stamp seal. These kinds of seals (shape, style of decoration and iconography) appear not only in Afghan Bactria, but also find parallels in seals/amulets in Tajikistan at Garav-Kala (Fig. 23) (Zeymal, 1985: 140, fig. 379 – 381), in Beshkent valley (Fig. 24) (Denisov, 1996) and in Khoresm (surface finds from the Koj-Krylgan-Kala area (Polevye issledovaniya..., 1960: 13, fig. 8); the seals from Koj-Krylgan-Kala proper are different). Decoration (deer hunting, griffin, camel) moulded on some flasks from Khoresm is also testimony of steppe connections of the popular arts of Central Asia during the Achaemenid-Hellenistic period. The exact function of the articles is unknown, but their decoration reflects the iconography of steppe art and especially of rock art. The repertoire of motifs is taken from the steppes. The horned winged monster, however, could be either an import from the Persian Empire, or a descendant of the Bronze Age Bactrian dragons. Usually, the Achaemenid horned felines and lions wear goat horns and not antlers. On the other hand, in steppe art, some felines wear antlers, such as wolves or a tiger from a Tuekta coffin ornament (Rudenko, 1960: fig. 154, *k*). However, the shape of the body and the position of body parts of the Bactrian monster are closer to the Achaemenian sphinx, as depicted on a gold bractea from the Treasure of the

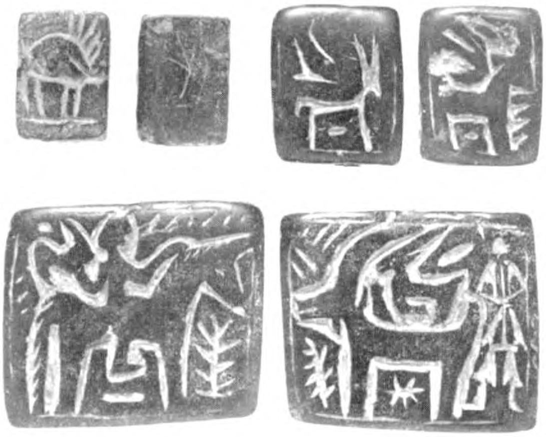

Fig. 23. Bactrian stone seals. Garav-Kala (Tajikistan).

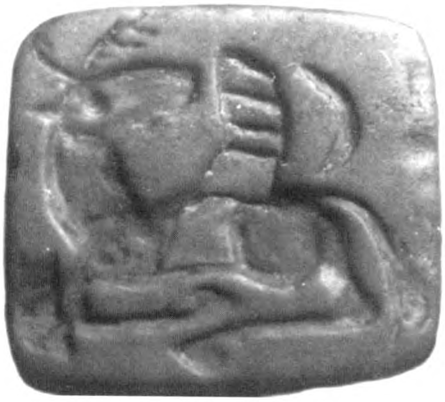

Fig. 24. Winged horse on a stone seal. Beshkent (Tajikistan).

Oxus, and in this case, the "antlers" are just a stylised crown (Dalton, 1964: fig. 27, plate XXI). Some ambiguity remains: the shape of the Achaemenian sphinx could have been the formal model of an antlered feline, depicted in the "linear cuneiform style." Another important point concerns the stylistic traits, such as the untreated patches, the round eye and beak motive, the curling and flat horns, the bent foreleg, the long claws and teeth – all come from steppe art and, notably, rock art (see, e.g., the Upper Indus horses). Finally, the linear treatment of the design, the oblique cutting technique and the cuneiform incisions are typical of the techniques utilised by the artisans of rock, stone, and wood in the steppes. During this time, tools were of metal, giving the artist the possibility of obtaining a fine work of stylisation.

Some observations, problems, and conclusions

Selection of objects of various historical origins: local objects of daily use in Xinjiang, or objects of lesser prestige in Bactria, the material of the images similar to petroglyphs are of different origins, and of different purpose in agricultural societies.

Selection of images: horse, etc. These themes are selected, since they do not represent all the corpus of petroglyphs. We recognise horses, wild horned animals (moufflon, deer), and predatory beasts (wolf, tiger) in both provinces. However, composite animals or monsters do not appear in Xinjiang, at least at this time. Two centuries later, the Shampula textiles are full of monsters recalling Pazyryk and Noin-Ula. The composite monsters, whatever their origin is (local or Achaemenian), have predecessors in the local substrate in Bactria and in South Siberia, but apparently not in the Taklamakan.

Non-selected images: it is interesting to note that some of the most popular motives of rock art are not represented: bird, chariot, hunting scenes, etc. This is probably partially due to the date (the range of themes and motives is smaller in the Iron Age than in the Bronze Age all over Central Asia) and to the type of society. Agriculturists could use many other means (spatial, plastic) to express their *Kunstwollen*, and their *Weltanschauung* that was not the same as the means of nomads.

Workshops: it is important to note that the Bactrian stone cutters, were apparently forming sort of a corporation specialised in the production of *pyxides*, and also pendants decorated with the same colour stone inlays as some lids and artifacts, such as drinking horns. They worked in a manner that cannot be said to be steppe or Achaemenian, nor at all Greek: it is Bactrian art (Francfort, 1984: 122 – 123). On the other hand, it is difficult to speak of workshops of wood decoration in Xinjiang: the production system must have been of a more individual type. We notice that similar linear carved wood decoration is also known from Qinghai (Kovalev, 2001), but perhaps not related to deer stones, nor to the Altai tombs (Kubarev, 1979: 72, fig. 19).

The importance of local popular arts in agricultural societies, impregnated by Central Asian themes, motifs, and style must be recognized; the importance of textiles and metals is clear; the presence of great empires is obvious, as well as that of the nomads and the steppe world and its art. The steppe artistic *koinè* is very widespread and hard to explain in terms of detailed mechanisms at the present stage of study. However, the fact that it influenced deeply Bactrian art in the Achaemenid and Hellenistic periods, inducing an original art, is of great historical importance. By contrast, the

Xinjiang artistic culture seems more authentically steppe. By another stronger contrast, the Pamir rock surfaces and burials are rather poor in those kinds of art manifestations. We have to look toward the Hunza, Gilgit, and the Upper Indus road for finding steppe art, or Bactrian type of art on rocks (Jettmar, 1991; Parzinger, 2001). This tradition, to some extent, is followed by some popular representations on amulets during the first centuries AD, for example, in Tajikistan (Dushanbe) and Uzbekistan (Kaunchi-II).

While situated close by, Taxila, as areas west of the Pamirs (Parthia, Margiana, and Chorasmia), was influenced by steppe art style, but via representations derived from more canonical forms of Achaemenian, Greco-Persian, and Hellenistic arts, as reflected in the steppes in the Oxus Treasure, and in the so-called "Second Oxus."

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STONE FIGURINES OF SHIVET-ULAN
(Central Mongolia)

Introduction

Recent extensive integration studies carried out by international expeditions have contributed to growing scientific interest in archaeological and historical sites of Mongolia. At present, scientists from Russia, the USA, Germany, France, Belgium, Turkey, and the Republic of Korea are working there. One of the most recent projects was the revision of historical sites and ancient inscriptions carried out by a joint Mongolian and Japanese expedition in 1997 (Provisional Report…, 1999: plate 5, a – i). Under this project, one of the largest memorials of ancient Turkic nobility, known in literature as the Shivet-Ulan complex, was studied. In this paper, we describe stone figurines, publish their pictures and color photographs, give more precise coordinates of this complex, and analyze the reality shown by these figurines. This work is an inherent part of a comprehensive scientific investigation and historical reconstruction.

Description of the site

The Ancient Turkic site of Shivet-Ulan is located 520 km west from Ulan-Baator, on the border between the Bayan-Agt Somon of the Bulgan Aimak* and the Khairkhan Somon of the Arkhangai Aimak (Fig. 1). The GPS coordinates of the site are E 102°00' 45" and N 48°47'54"; the height above sea level is 1,340 m.

The complex is situated on the eastern side of a low hill (Fig. 2), at the confluence of the Khanui and Khuni rivers. Its external wall is constructed of stone. A similar stonewall divides the internal area into two sections from east to west. The western section has a large, high mound with a hole in the center left, probably made by plunderers. In the eastern section, there are stone human figurines, sculptures of lions and sheep, and ruins of a funeral temple recognized by fragments of bricks and tiles (Fig. 3). The wall behind the entrance into the eastern section once had a sandstone slab with 60 characters inscribed on its front side (Fig. 4). Surprisingly, this complex has no balbals, which are vertical stone slabs typical of the Ancient Turkic culture. Stone pedestals depicting turtles, and stone stelae with inscriptions common for memorial temples of the ruling clan of the Turks-Tyugyu are also absent.* All stone sculptures at the Shivet-Ulan site are made of dark gray volcanic basalt from a stone outcrop located nearby. Obviously, there was a mason workshop not far from this place, where nearly twenty sculptures could have been produced in a short time.

In previous publications, archaeologists reported different numbers of stone figurines at the Shivet-Ulan memorial. Bambaev wrote about nine human figurines and five sculptures of dogs (lions). Dorjsuren reported only six human figurines, but did not mention sculptures of lions or rams. According to Kharzhaubai, there were figures of nine people, four to five lions, and four rams. Voitov also mentioned nine stone figurines of people, four lions, and four rams. During our survey of this site in 1997, we found sculptures of eight people, five rams, and two lions. All the sculptures had been removed

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* *Somon* and *aimak* are administrative-territorial units in Mongolia equivalent to province and county respectively

* Site description and plan and a picture of a stele with *tamgas* are cited after Voitov (1996· 30, fig 10, 42)

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from their original places and arranged chaotically. One broken human figurine, two sculptures of lions, and one of a ram were transported to various places in the Arkhangai and Bulgan Aimaks.

Unlike other stone figurines at memorial Mongolian complexes, all Shivet-Ulan human sculptures are shown in their full height. We can distinguish one female and eight male figures. The heads of all sculptures have been lost, probably, during the last hundred years. The photographs by Ramsted, taken in 1912, show two figures intact. Although some sculptures have been preserved only in fragments, in this paper, we give a full description of all the preserved stone sculptures of people, lions, and rams. Some of the descriptions are illustrated with photographs (Fig. 5 – 9), other descriptions are illustrated with drawings (Fig. 10, 11).

Sculpture 1 (see Fig. 10, *1*). A man is shown with his arms folded on his chest; the hands are hidden inside long sleeves. A long outer garment with triangular lapels is unfastened on the chest. Under it, one can see the edge of a high shirt neckline. The left lap of the garment overlaps the right lap. The man is wearing a belt, which is smooth on the front side and has an engraved

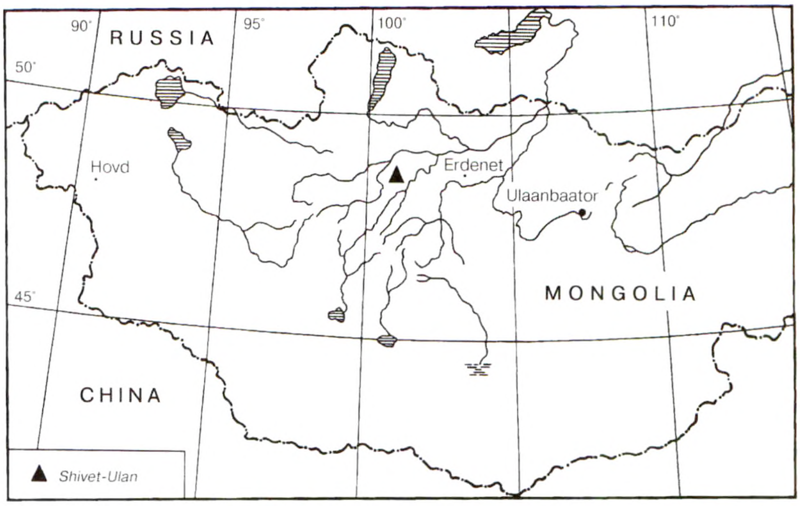

Fig. 1. Map of Mongolia and the location of the Shivet-Ulan memorial.

Fig. 2. General view of the Shivet-Ulan site.

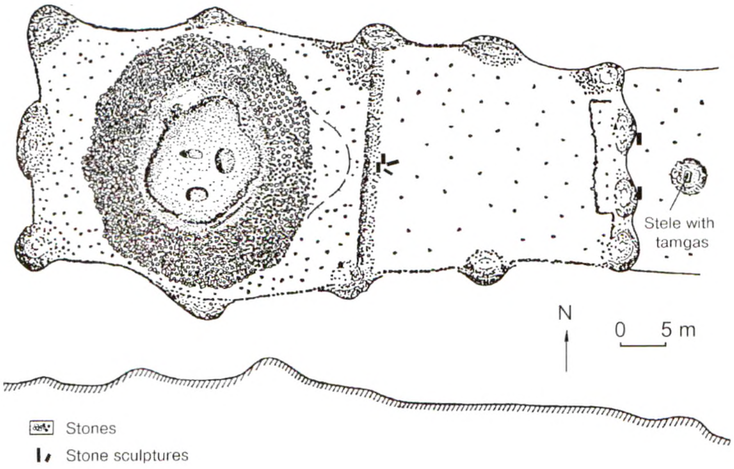

Fig. 3. Plan of the Shivet-Ulan site.

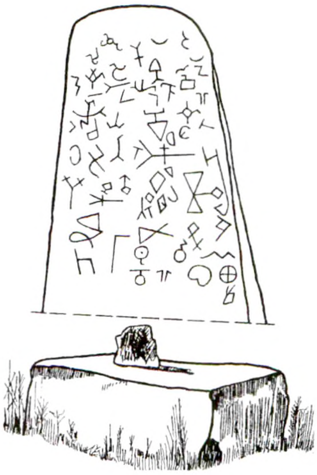

Fig. 4. Commemorative stele with *tamgas*. Shivet-Ulan.

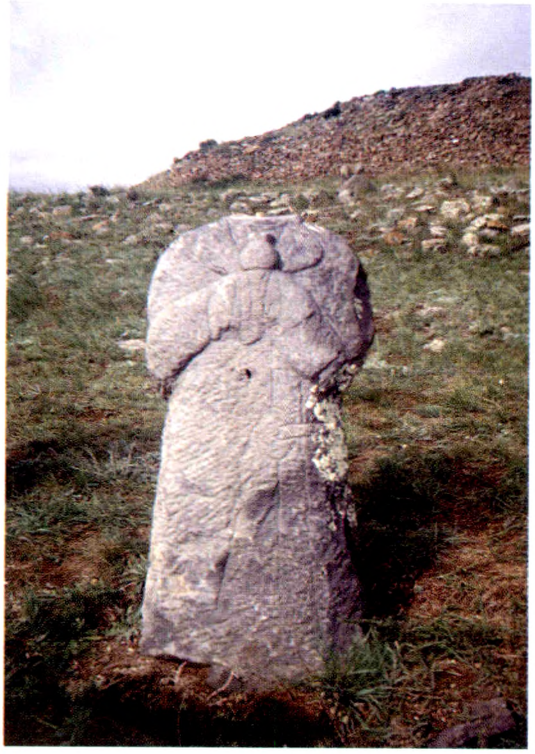

Fig. 5. Sculpture 1. En face view. Shivet-Ulan.

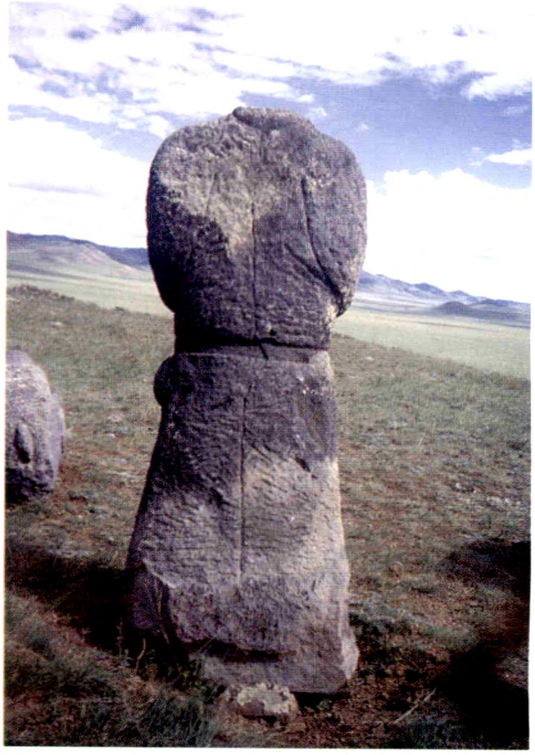

Fig. 6. Sculpture 1. Rear view. Shivet-Ulan.

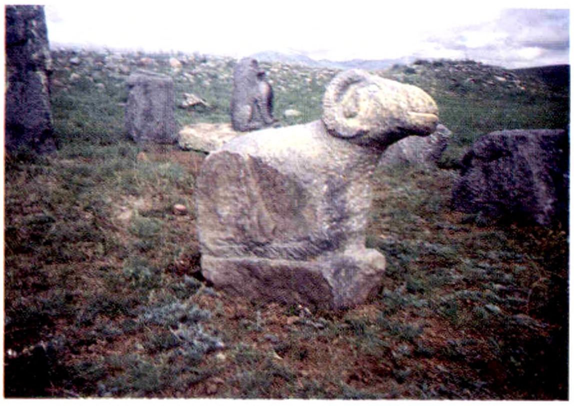

Fig. 7. Ram 1. Shivet-Ulan.

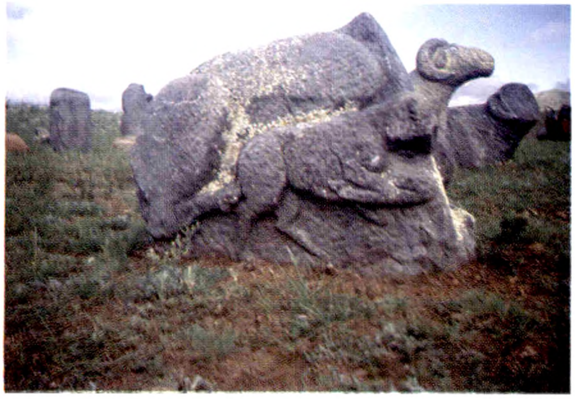

Fig. 8. Ram (ewe?) 3 with a low-relief image of a lamb. Shivet-Ulan.

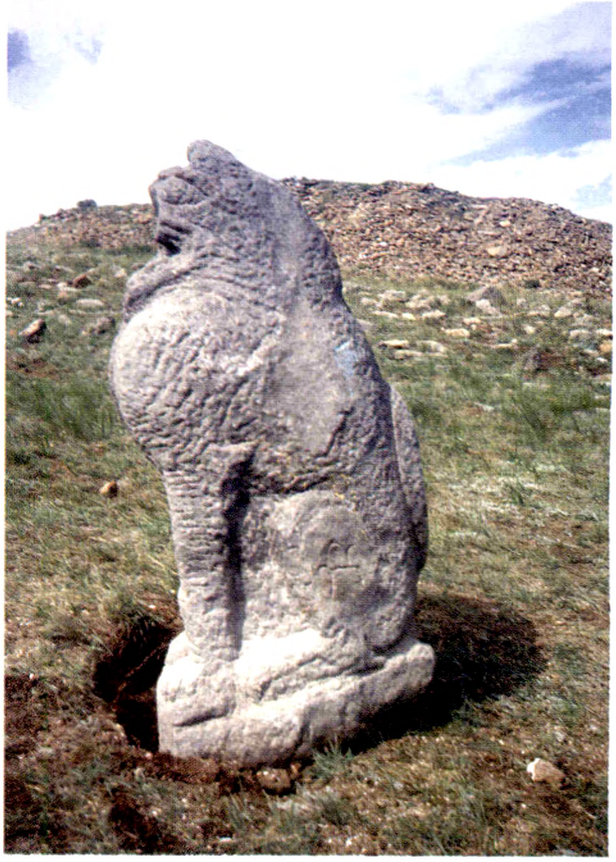

Fig. 9. Lion 1. Shivet-Ulan.

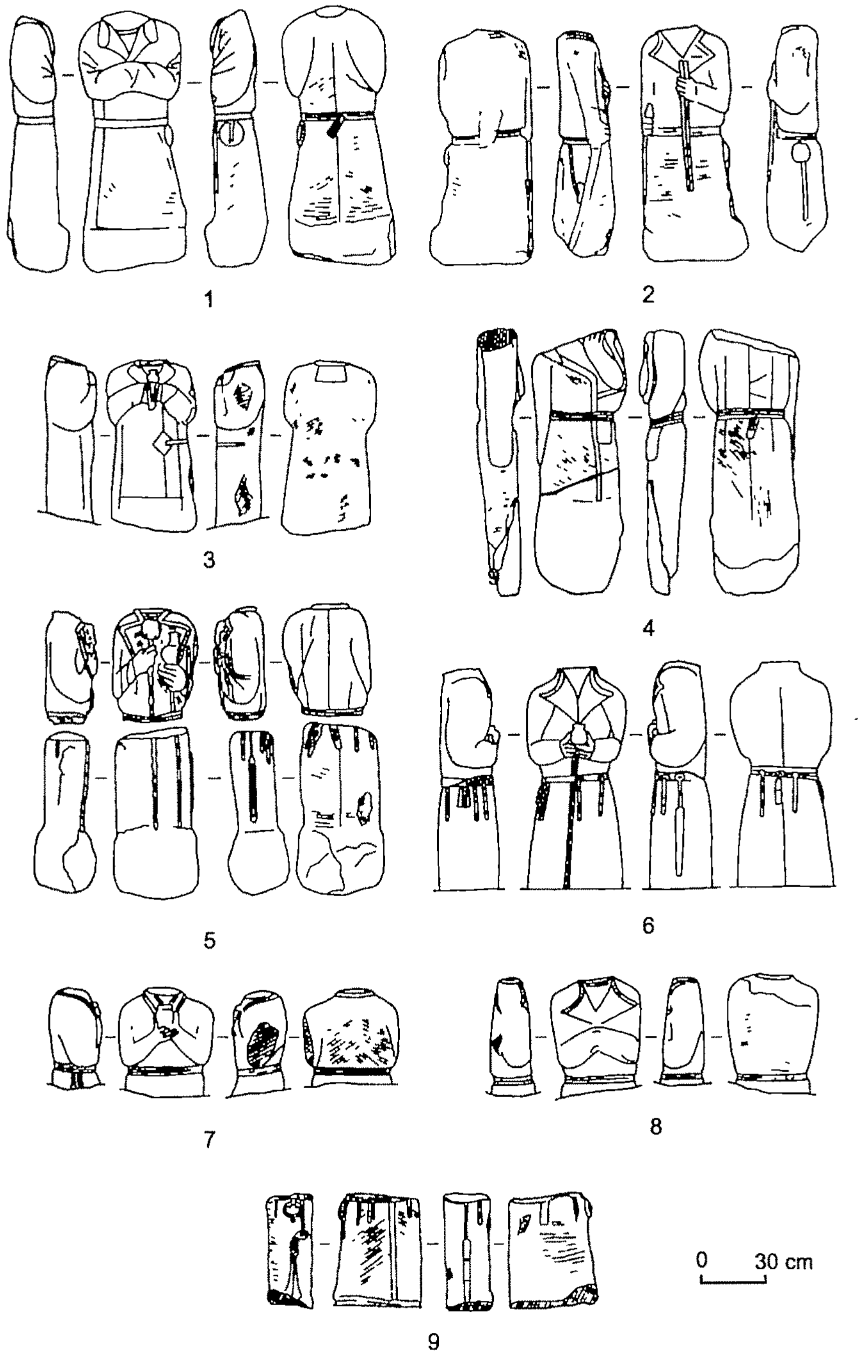

Fig 10 Stone sculptures of people. Shivet-Ulan.

belt buckle on the back; parallel lines divide this belt into three narrow stripes. On the back, there is a long vertical line, which obviously shows the central seam of the garment. There is a round bag (*kaptargak*) on the left side of the figurine. The sculpture size is 118 × 47 × 25 cm.

Sculpture 2 (see Fig. 10, *2*) This figure holds a long, narrow stick, probably a staff or a baton, in its left hand. The right arm points downward, and the hand lays on a saber hilt. A long garment, with wide triangular lapels from both sides, is unfastened on the chest. We cannot determine the wrap of this garment. The belt is decorated with a straight line pecked inside it. A round *kaptargak* with a long, narrow object, possibly a *musat*, which is a whetstone, or a stripe for suspending other things, is fastened to the left side. A long sword (?) with a crooked hilt is depicted on the right side of the figurine. The sword is obviously in a sheath fastened with a long sword-belt. The figurine size is 107 × 40 × 22 cm.

Sculpture 3 (see Fig. 10, *3*). A human being holds a round vessel near the chest; a small shawl is hanging from under this vessel. A long garment, with round lapels, has a leftward wrap. Under this garment, one can see a shirt's

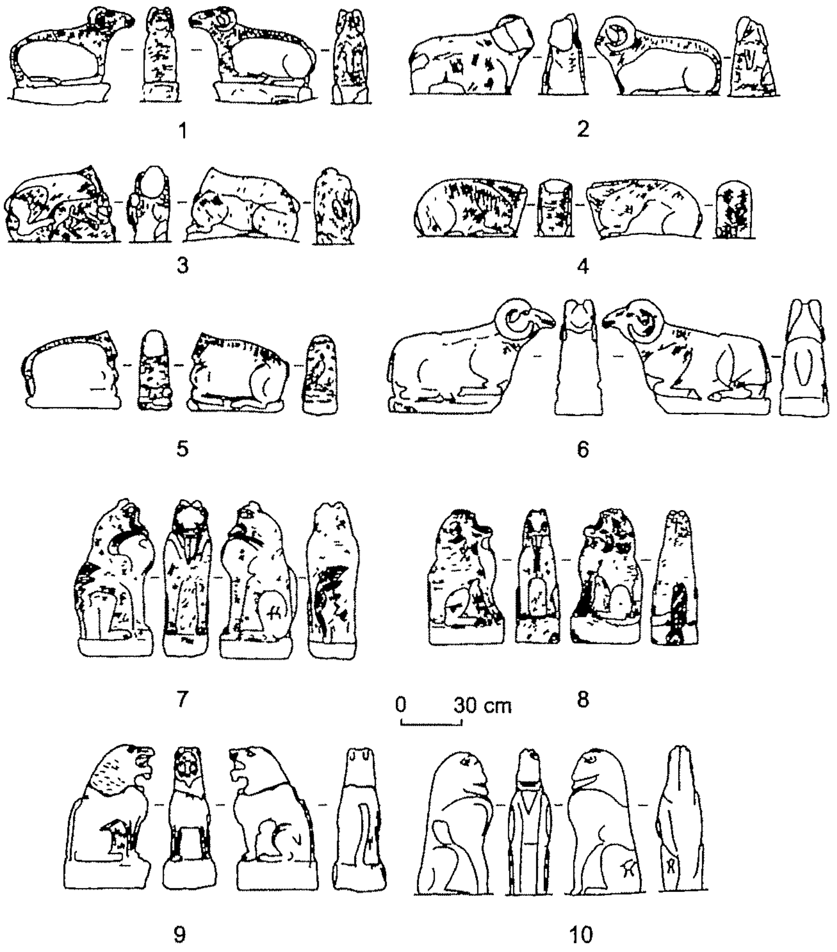

Fig 11 Stone rams (*1 – 6*) and lions (*7 – 10*). Shivet-Ulan.

collar. There is no belt. A rhombic object is attached to the left side of the garment near the stomach, which is, probably, a buckle, or more likely, an attached piece of fabric with a string for tying the garment shown as a short, shallow scratch. A relief trapezoidal object on the person's back depicts a lower edge of the haircut or an occipital part of the hair dress. The size of the figure is 80 × 42 × 22 cm.

Sculpture 4 (see Fig. 10, *4*). The upper part of the figure, including its head, has not been preserved. The right arm points downward, the left sleeve that is stuck in the belt is empty, and the left uncovered arm is bent so that the left hand is near the shoulder. The garment is wrapped leftward; the edges of the upper lap are decorated with a wide hem. A small rectangular bag is fastened to the belt, which is divided into three parts by two parallel lines. One long and two short vertical lines and a belt's tip stuck under the belt are depicted on the person's back. The sculpture size is 121 × 45 × 20 cm.

Sculpture 5 (see Fig. 10, *5*). This sculpture consists of two fragments broken along the waist. In its left hand, the figure holds a round vessel with a high neck and an everted rim. The right arm is bent at a sharp angle. In its right hand, the man clasps a long object, possibly a staff tipped with a large sphere. His long garment, with large triangular lapels and a narrow hem along the edges, is unfastened at the chest. A line pecked on the left side of the figure depicts probably an edge of the left lap of the garment, which is wrapped leftward. The complex belt consists of square plaques and has several decorative straps. A *musat* (?), which is depicted on the left side of the figurine, is attached to one of these straps. A long vertical line runs through the center of the back, and a relief belt tip can be seen near the belt. At present, the upper part of the sculpture is exhibited at the Cultural Center of the Khairkhan Somon, Arkhangai Aimak, and its lower part is at its original site. The sculpture size is 123 × 40 × 23 cm.

Sculpture 6 (see Fig. 10, *6*). A man holds a small round vessel with a straight neck near his stomach. The garment has large triangular lapels folded back from both sides. The upper part of the garment's collar is trimmed with a narrow hem. The complex belt consists of round plaques and is decorated with hanging straps There is a small rectangular bag on the right side and a long, narrow whetstone on the left side. A long vertical line runs along the back. The sculpture is placed at the entrance of the Regional Museum of the city of Erdenet. The sculpture size is 100 × 47 × 23 cm.

Sculpture 7 (see Fig. 10, *7*). A man holds a vessel with both hands near the chest. The shape of the vessel is similar to that of a ceramic jar with a wide neck and a short rim. The garment's collar is trimmed with a wide hem. The belt is decorated with parallel lines on the front side and rectangular plaques with hanging straps on the right side. The posture of this figure is still unclear because its lower part remains below the surface of the earth. It is situated near the southern side of the funeral temple, in the earthen mound. The figure size is 50 × 44 × 25 cm.

Sculpture 8 (see Fig 10, *8*). The arms of this sculpture are folded on the chest. The hands are not shown. It seems they are hidden, or more exactly, inserted into long sleeves of the outer garment. This garment has a low neck and wide triangular lapels. A horizontal line runs along the center of the belt. The posture of the figurine is unclear because its lower part is sunken below the surface the earth. This sculpture is located near Sculpture 7. The figurine is 52 × 41 × 19 cm.

Sculpture 9 (see Fig. 10, *9*). This is a broken lower part of a stone sculpture of a man. A vertical line, pecked on the left side of the figurine, depicts an edge trimmed with a wide hem and suggests a leftward wrap of the garment. The belt, with a horizontally pecked line in the center, consists of square plaques and is decorated with straps. On the right side, there is a round ornamented bag or steel for striking fire(?), and an unidentified object (probably a shawl tied in a knot) suspended on a strap. A whetstone, also suspended on a strap, is depicted on the left side. A belt tip is shown on the rear side of the figurine near the belt. The figurine's size is 50 × 41 × 21 cm.

Ram 1 (see Fig. 11, *1*). A ram lies with bent knees. It has curved horns and raised ears. Its tail is thin and long The sculpture is on a low pedestal. The size is 77 × 60 × 20 cm.

Ram 2 (see Fig. 11, *2*). The technique of this sculpture is identical to the first figurine The face and a part of the head have been lost. A curved horn and a raised ear have been preserved only on the left side. The ram has a thin, long tail The size of this sculpture is 78 × 50 × 27 cm

Ram or Ewe 3 (see Fig. 11, *3*). The animal lies on its belly. The head has been lost. Interestingly, a figurine of a running lamb is depicted in low relief on the right side of the ewe (?). This figurine is 68 × 49 × 23 cm and the lamb is 39 × 30 × 9 cm.

Ram or Ewe 4 (see Fig. 11, *4*). The posture of the animal is identical to the above. The head has not been preserved. The size is 73 × 37 × 21 cm.

Ram or Ewe 5 (see Fig. 11, *5*). The posture of the animal is identical to the above. The head has not been preserved. Bent legs are clearly shown only on the left side of the figure. The size is 62 × 48 × 23 cm.

Ram 5 (see Fig. 11, *6*). This sculpture of a lying animal has been well preserved. It has large curved horns and ears shown in relief. The eyes and the mouth are clearly shown against the monolithic background of the head. The tail is long and thick (shown in low relief). The sculpture stands on a low pedestal. At present, it is exhibited at the administrative center of the Khairkhan Somon of the Arkhangai Aimak. The size is 108 × 70 × 29 cm.

Lion 1 (see Fig. 11, *7*). The lion is shown sitting on its bent hind legs with an open mouth. The front legs are straight. A small fragment of lion's snout has been lost. The lion has prominent, large eyes and small relief ears. The tail is shown with parallel curved scratches. The lion's body has lots of small chips, which obviously denote fur. An Ancient Turkic *tamga*, in the shape of a mountain goat, is pecked on the lion's left leg. The sculpture stands on a high pedestal. The figurine's size is 97 × 32 × 50 cm.

Lion 2 (see Fig. 11, *8*). The technique of this sculpture is similar to the above The head has been slightly damaged. A mane is shown with parallel round scratches, and fur is denoted by small frequent chips. The tail has been damaged. This figurine size is 82 × 42 × 28 cm

Lion 3 (see Fig. 11, *9*). The posture and carving technique of this sculpture are identical to the lion figurines described above. The head has been chipped off but it is possible to restore it. The lion has small, prominent eyes. Its front legs are covered with parallel vertical scratches The tail is folded on the back. The figurine stands on a high pedestal. At present, the sculpture is exhibited in the administrative center of the Khairkhan Somon of the Arkhangai Aimak. The sculpture's size 89 × 50 × 27 cm.

Lion 4 (see Fig. 11, *10*). The posture and technique of this sculpture are similar to the three lions described above. A small fragment of snout has been chipped off, and there are traces of cement paste on it, which obviously appeared in the modern period. The lion has large, prominent eyes. There is a triangle cut on the chest of the lion with its sharp angle downwards. An Ancient Turkic *tamga,* in the shape of a goat, is engraved on the left thigh of the lion. The sculpture stands on a pedestal, now sunken below the surface of the earth. At present, one can see this sculpture at the entrance of the Regional Museum of the city of Erdenet. The size of the sculpture is 90 × 37 × 29 cm.

Description and chronology of the complex

The Shivet-Ulan memorial complex was discovered by Finnish scientists in 1912 (Ramstedt et al., 1958). After that, it was studied by Bambaev (in 1927)*, Dorzhsuren (in 1956) (1957), Volkov, Svinin, and Tseveendorj (in 1976) (Voitov, 1986: 123), Klyashtornyi (1978: 575 – 576), and Kharzhaubai (in 1977) (1979: 15 – 23; 1982: 103 – 120). Efforts of our predecessors yielded a detailed description of the site, its topologic plan, photographs and drawings of some of the sculptures as well as possible dates of this memorial.

T. Dorzhsuren, one of the first investigators of this site, proposed that the Shivet-Ulan complex was built before the 6th century, i.e., by the time the Ancient Turkic runic written language had not been finally formed (1957: 48). As Klyashotrnyi, a Russian Turkologist (1978: 576), and a Mongolian scientist, S. Kharzhaubai (1979: 29) believe, this site was built in AD 693 to commemorate the founder of the Second Turkic Kaganat (state), Il'teres-kagan or Kutlug. Voitov, who generally supported this idea, noted a number of special features of this site and classified it as a large memorial complex of Ancient Turkic aristocrats. Unlike ordinary memorial complexes, large ones had walls and trenches surrounding these sites (1996: 30). Voitov determined the Shivet-Ulan complex as a separate variant of memorials of Ancient Turkic aristocracy (Ibid.: 30). This complex is of interest because of its unusual planning and new construction elements (for example, slabs–stelae with *tamgas*, etc.) and also an original iconography of stone sculptures and the largest number of animal sculptures within one complex.

Iconography and individual stylistic features of the Shivet-Ulan sculptures are of special interest. For example, although arms can be depicted in various positions, most often, they are shown bent on the chest: two people have their arms bent, not holding any other objects (Sculptures 1, 8) and others hold vessels in their hands (Sculptures 3, 6, 7). Some men have staffs or batons in their hands (Sculptures 2, 5), which served as a mark of authority, noble origin, and prosperity. Two similar objects have been found among Turkic parietal art of Mongolia: an engraved Turk leant on a staff (Potanin, 1881: fig. 37; Mongol nutag..., 1999: 108 – 109; Kubarev G.V., 2000: fig. 3, *21*) and a pecked rider with a small baton or a club, who takes part in falconry (Kubarev V.D., 2001b: fig. 9, *a*). Obviously, these prestigious objects shown on the Shivet-Ulan sculptures must be compared to batons, clubs, and staffs of the so-called "wedding procession" on the wall paintings of Afrasiab (western Central Asia) (Pugachenkova, Rempel, 1982. 117 – 121). As is known, the 7th – 8th century murals depict only noble Turks and Sogdians.

The outer garment is shown on all nine Shivet-Ulan sculptures. However, only six garments have triangular lapels folded back from both sides. These lapels were typical of rich clothes of Ancient Turk nobility (Kubarev G.V., 2000: 81 – 85). The left-side wrap was recognized only on three sculptures and the right-side wrap, on one sculpture. However, the wrap of garments of three sculptures remained unidentified. Sculpture 4 of Shivet-Ulan is an illustration of an ancient nomadic tradition of sticking an empty sleeve under the belt. The arm of the sculpture is bent and the hand is placed near the shoulder (see Fig. 10, *4*). We are not aware of any other stone sculptures illustrating this manner of wearing outer garments, though as we noted above, it was extremely popular among Central Asian nomads. Probably, its rarity is explained by technical difficulties. We note that the Mongols, Tibetans, and other nomadic peoples of Asian mountains and steppe, even in hottest weather, do not take off their fur-coats or garments to cool their body. They usually uncover only one arm and a shoulder.

All male Shivet-Ulan sculptures wear belts that are decorated uniformly and inartistically. Dominating are belts with one or two parallel lines that divide them into several narrow bands The semantic meaning of this decoration is still unclear. The same can be said about composite belts constructed of belt plaques. Most of them are too amorphous, and those depicted more clearly cannot give us any idea of the date of this type of decoration (they were in use for a long time and over a vast territory). According to the data on the material and spiritual culture of the Central Asian nomads, belts were a necessary element of the clothes of an ancient Turk warrior. The color, material, decorations, and objects fastened to the belts served as badges of ranks among military aristocracy, priests, bureaucracy, and merchants (Kubarev V.D., 1984: 36). Rich belts were composed of sets of gold and silver plaques of various shapes (Fig. 12), sometimes decorated with animal scenes and encrusted with precious stones (Dobzhanskii, 1990: 77 – 78). The belt of an ancient Turk warrior was also a symbol of his "soldier glory" (Mogilnikov, 1981: 41). Therefore, most often, armed male warriors are sculptured with belts, and female figurines, as a rule, do not wear belts (see Fig. 10, *3*). For example, in the Russian Altai, belts are shown only on 97 of 286 stone figurines (Kubarev V.D., 1984: 36; 2001a: 25). (Does it mean that some of the Altaian sculptures are female images?) The same situation is typical of the Turk-Mongol sculptures from Mongolia (more than 500 objects) (Bayer, 1994, Bayar, 1997, 2001;

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* Bambaev B *Predvaritelnyi kratkii otchet Bambaeva Baldzhi o rabote v etnologo-lingvisticheskom otryade nauchnoi ekspeditsii AN SSSR po issledovaniyu Vneshnei Mongolii i Tannu-Tuvy, sostavlennyi v 1927 godu* Department of Manuscripts, Institute of History of the Mongolian Academy of Sciences, F IX, vol. 7

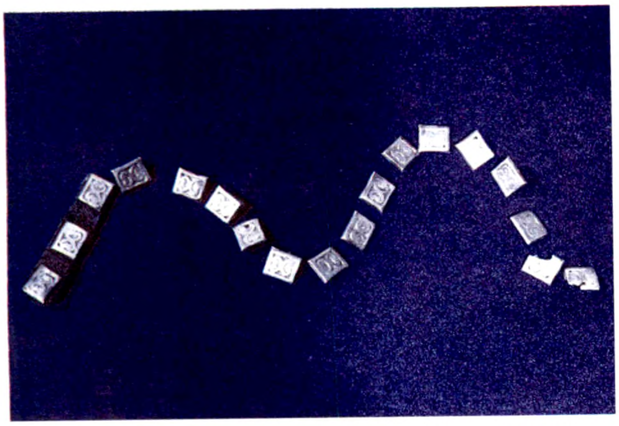

Fig. 12. Silver plaques of a composite belt of a Turkic noble. Yustyd XII. Russian Altai.

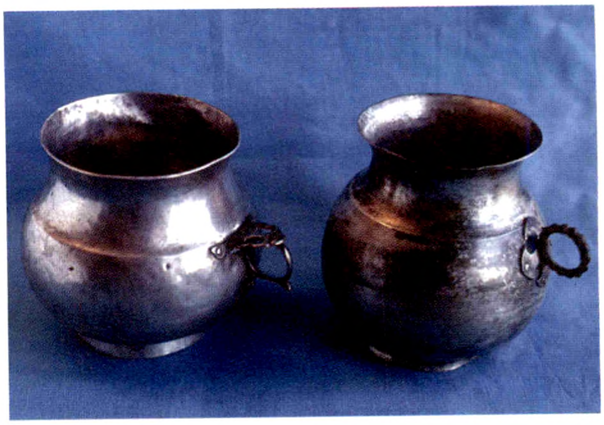

Fig. 13. Silver vessels from Ancient Turk funeral-memorial complexes in the Russian Altai: from Balyk-Sook I (left) and Yustyd XII (right).

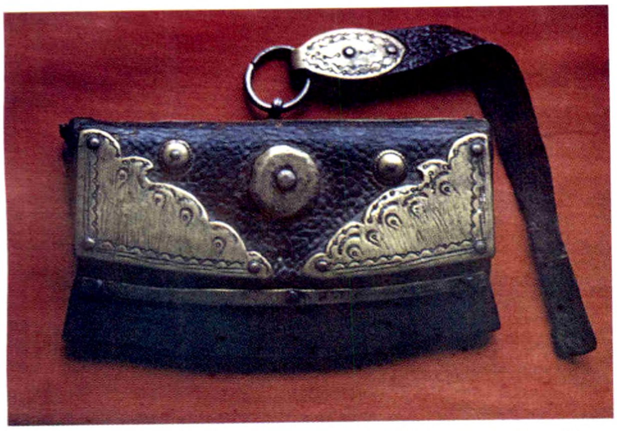

Fig. 14. Altaian bag – *kresalo* (*ottuk*). From ethnographic collections from the Russian Altai.

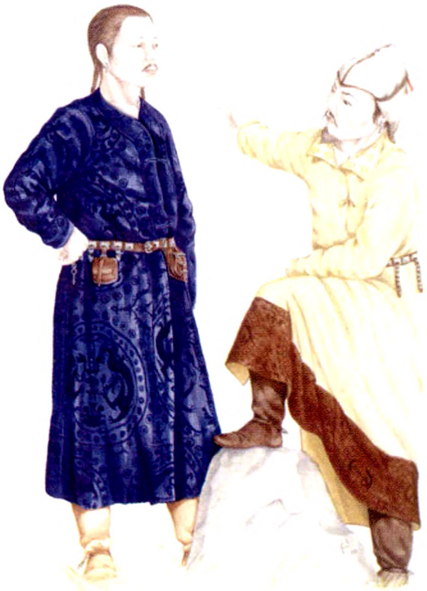

Fig. 15. Male costumes of ancient Turks (AD 7th – 8th century). Reconstructed by G.V. Kubarev and D.V. Pozdnyakov from archaeological materials found at the Altai.

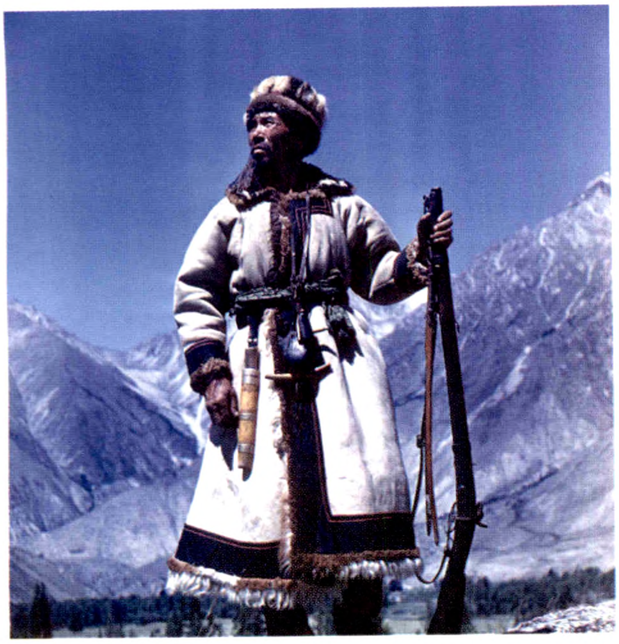

Fig. 16. Costume of an Altaian hunter. The Argut River valley in the Russian Altai.

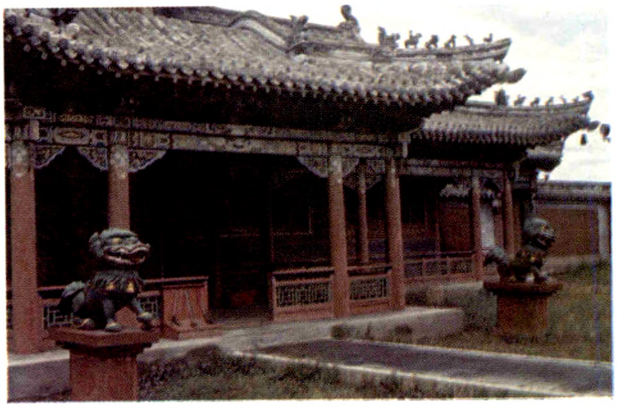

Fig. 17. Fantastic lions guarding the Bogdo-Gegen palace. Ulaanbaatar, Mongolia.

Kubarev V.D., Tseveendorj, 1995, 2002; Kubarev V.D., Zevendorz, 1997; Bayar, Erdenebaator, 1999). The ancient tradition of women normally not wearing belts can still be traced among modern nomads. In Mongolian language, human sex can be denoted by the words *busgui* (woman), i.e., without a belt, and *bustei* (man), i.e., with a belt (Vyatkina, 1960: 191; Bayar, 2001: 23). In ancient times, the belt was of extreme importance among various Mongolian peoples. Thus, as *The Secret History of the Mongols* tells, when the Merkits attacked Gengiz Khan's camp to kill him, he found a shelter on the Burkhan-Khaldun Mountain. Once safe, Gengiz Khan made a sacrifice after he loosened his belt and took off his hat to thank Burkhan-Khaldun for his rescue (Vyatkina, 1960: 191).

There is a female sculpture at the Shivet-Ulan site (see Fig. 10, *3*), which is similar to a female figurine at the Kyul-Tegin memorial Both sculptures depict women wearing similar long garments with a left-hand wrap. They have no belts, and garment edges are tied with a special string made of a narrow strip of fabric or leather. Both women hold shawls near their breasts. The Shivet-Ulan woman holds a vessel on the shawl. This detail of the funeral rite illustrates a Mongolian tradition of offering drinks (*koumiss* (fermented mare's milk), *araka* (milk vodka), etc.) to respected guests with both hands in a bowl for special occasions. A *khadak* (belt made of silk or other fabrics) was often laid on the hands under the bowl. The ends of the *khadak* hung freely from the hands of a giver. Such posture (vessel in both hands) of the stone sculptures not only "coincides with a posture of the Chinese etiquette" (Ermolenko, 2002 190), but also is typical of different Eurasian regions found on nomadic sculptures of various epochs and cultures. Analysis of sculptures of various epochs found in the ancient Orient brought Ermolenko to the conclusion that in eastern and western Central Asia, an image of people holding vessels with both hands is typical of the Uigur*, Kypchak, and Polovetsk traditions. Nevertheless, it can often be found in the Ancient Turk sculpture (2002: 191). Three Shivet-Ulan sculptures showing people with vessels in both hands support this idea (see Fig. 10, *3*, *6*, *7*) The shape of the vessels depicted is an additional argument for their Turkic origin (7th – 8th AD). Similar silver "mugs" with Orkhon-Enisei inscriptions and ancient Turkic *tamgas* (Fig. 13) are often found in Ancient Turkic burials of the Altai (Kiselev, 1951: plate LII, *4* – *7*; Kubarev V.D., 1987: 251; Savinov, 1994. fig. 109; Kubarev G.V., 1995: fig. 5, *2*). Two silver vessels, analogous to the Shivet-Ulan vessels, found near Ancient Turkic memorial enclosures on the Yustyd River in the eastern Altai are important for dating Mongol sculptures (Kubarev V.D., 1984: 57). It has been recently revealed that a miniature gold bowl and vessel of foreign origin were found at the funeral complex of Bilge-kagan in Mongolia. Luxurious metallic dishes, found at the memorial complexes of Turkic aristocracy and ceramic vessels found inside memorial enclosures belonging to ordinary nomads, suggest that worshiping–commemoration of ancestors was widely spread in the tribal Turkic society.

Small bags with steel for striking fire were a traditional, necessary component of the Ancient Turkic costume Five Shivet-Ulan sculptures have bags of different shapes (see Fig. 10, *1*, *2*, *4*, *6*, *9*) Three of them wear the bags fastened to the left side, and two other sculptures have them attached to the right side. William Rubruk saw such bags called *kaptargaks* among the Kypchaks. This name has preserved in Altaian language to denote hunters' round leather bags. Several similar leather bags found in Ancient Turkic burials in the Altai and Tuva were decorated on their front sides with a patterned metallic plaque, *kresalo* (a tool used to strike fire). Such plaques were used among the Sayano-Altai peoples until the ethnographic time. The Altaians and Tuvinians called this article *ottuk*, a tool for fire (Fig. 14).

Thus, analysis of stylistic features and reconstruction of the costume of the Shivet-Ulan stone sculptures suggest that this memorial complex dates to the 7th – first half of the 8th centuries AD. Obviously, a syncretic costume that emerged from the synthesis of the Sogdian and Turkic costumes had been already formed in the Ancient Turkic epoch (Fig. 15). To some extent, this "smoothing" of distinctive ethnic features contributed to uniformity of the nomadic costume of later periods. The Shivet-Ulan outer garment, which is classified as caftans or robes, can be found not only on Ancient Turkic sculptures, but also on later Mongolian and Polovetsk sculptures. The costume of medieval nomads was unchanged until the ethnographic period and is only slightly different from the costume of modern nomads of Central Asia (Fig. 16).

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* A small group of Uigur male sculptures was reasonably isolated by Kyzlasov (1979 80 – 82). A number of stylistic and ethnographic features, such as special headdresses different from ancient Turkic hats, the absence of weapons on the figurines, narrow-neck jars, large sizes and monumentality of the sculptures and their rarity, suggest a reliable date for these sculptures of the AD 8th – 10th centuries. Even a superficial glance at these sculptures, either original or their illustrations, is enough to understand the difference between the Uigur and Turkic sculptures (see (Ibid : fig. 26, 27, Kubarev V.D., Tseveendorj, 1995· fig. 3, 7, 4, *11*, *12*, Bayar, Erdenebaatar, 1999: sculptures 16, 42 – 44, 46)). Concerning the sculptures of type 3 (with vessels in both hands) from Gorny Altai, only two large figurines (Kubarev V.D., 1984: sculptures 41, 255) can be reliably dated to the time of the Uigur State (Kaganat) (8th – 9th centuries AD) Two other sculptures (Ibid.· sculptures 181, 248) probably belong to the same period but were carved by the Turks-Tyugyu and mounted on the eastern side of the funeral fence.

As a rule, stone sculptures found at large memorial complexes of Ancient Turkic nobility depict people in three canonic postures. Thus, a person who is commemorated by this memorial was carved sitting with crossed legs. Noblemen and military leaders were shown in full height, and servants and foreigners were depicted kneeled. Obviously, a posture of every figure reflected the social status of this person, his degree of nobility, and "position " However, all the Shivet-Ulan people are shown in full height. Therefore, we cannot distinguish the "central figure" of the memorial. In this connection, the Shivet-Ulan complex is similar to an earlier site of Unget at which there are no sitting figures among the more than 30 sculptures.

As mentioned above, together with human figures, the Shivet-Ulan site yields sculptures of rams and lions. In Mongolia, passages with sculptures of people and animals on both sides are found at the memorials to the most famous rulers: Bilge-kagan, Kyul-tegin, and Tonyukuk, and at the Ongins, Unget, and Ikh-Khushot memorials to unknown rulers. The Shivet-Ulan site yielded the largest number of animal sculptures, which distinguishes this site from other Ancient Turkic sites in Mongolia. An original sculpture of an ewe(?) with a low-relief image of a lamb is of special interest (see Fig. 11, *3*). We do not know any analogues to this image at other Turkic memorials. Two lion figures have *tamgas* similar in shape to a mountain goat (see Fig. 11, *7*, *10*), which were widely spread in the period of the Second Turkic Kaganat.

Outside Mongolia, memorial complexes that include synchronously constructed sculptures of people, rams, and lions have been found only in Tuva and Khakassiya As Evtyukhova believes, these rare monuments were built in these territories as a result of penetration of the noble Orkhon Turks into the northern lands (1952: 118). This idea was confirmed by Kyzlasov, who excavated a memorial to a noble Turk near the village of Saryg-Bulun in 1955 (1979: 129 – 131). Borisenko and Hudiakov (1999: 8 – 13) also relate six stone sculptures from the middle Enisei River to the presence of the Turks in the Minusinsk Basin. However, there is another opinion of the appearance of the so-called Ancient Turkic sculptures of people and animals in Khakasiya. Thus, more than 50 years ago, Evtyukhova concluded that there were only two Turkic sculptures in the Minusinsk Basin: sculptures from Chebaki and Saraly in Khakasiya (1952. 120). Kiselev also believed that some of the Minusinsk sculptures could have been brought to this territory (1951: 631).

Archaeologists from Novosibirsk (Mitko and Teterin) gave a more straightforward explanation: Most of the sculptures were found without any connection to funeral fences. "Four of these figurines are known only by very poor drawings, and the fifth sculpture has been seriously damaged... Therefore, it is doubtful that they belong to the ancient Turks proper. They might have been produced by Kyrgyz carvers, who imitated the work of Turkic sculptors. The only memorial and sculpture near the village of Znamenka are an exception rather than a rule, which testifies to the fact that funeral fences and stone figurines were not common in the middle Enisei River basin" (1998: 397).

Stone sculptures of lions and rams are also rare in South Siberia. Only one ram figurine is exhibited at the Barnaul Museum of Regional Studies. Its long and complicated story was published by Borisenko and Hudiakov (2000: 139), who concluded that it could have been brought not from the Yenisei River basin, but from Gorny Altai.* The authors believe that the ram figurine from the Barnaul Museum is stylistically similar to ram sculptures found at the Shivet-Ulan complex and the memorial in the Abakan steppe in Khakasiya (Ibid.: 139). Ram figurines were also found at a funeral site near the settlement of Oimak in Tuva (Alt-Altaische Kunstdenkmäler..., 1931: abb. 335, 338, 339), but they are smaller in size and date to the Mongolian period (Kyzlasov, 1979: 151). Voitov believes that sculptures of lions and rams were erected only at the memorials to the highest aristocracy of the Second Turkic Kaganat and counts more than 20 of such animal figurines found occasionally in Mongolia and other regions (1996: 97). Other archeologists agree with this idea (Borisenko, Hudiakov, 1999: 13 – 14; 2000: 138 – 139). However, it is well known that the Turks borrowed the tradition of producing stone figurines of lions and other animals from the Chinese (Kiselev, 1951: 509; Novgorodova, 1980: 240).

In later times, this tradition became widely spread in religious architecture, for example, lions served as guards in front of many Lamaistic temples (Novgorodova, 1980: abb. 23, 24; Mongol nutag..., 1999 261 – 262). They also guarded entrances to *datsans* (Lamaistic church) and palaces (Fig. 17). Similarly, a pair of stone lions guarded the entrance to the Shivet-Ulan funeral temple. Thus, we might assume that the animal stone figurines were in use even after the breakdown of the Turkic Kaganats until the late medieval epoch.**

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* To prove their statement, the authors refer to the study by V D Kubarev and state incorrectly that sculptures of "lying lions and rams in analogous postures" were found at the Turkic memorials in the Altai (Borisenko, Hudiakov, 2000: 138). Actually, the fifteen Turkic memorials, known today in the Altai, contained no animal figures (see (Kubarev V D , 1984: 51 – 55, Kubarev V.D., Tseveendorzh, 2002· 84 – 85))

** Lion figurines in front of many administrative buildings in Ulaanbaatar are traces of this ancient tradition

Conclusion

The Shivet-Ulan memorial, with a set of original stone figurines, is one of the unique cultural sites of ancient nomads, which, fortunately, has been preserved until present day. Chronologically, this memorial, which relates to more ancient complexes such as the Ungetu, belongs to a group of religious–memorial sites of Ancient Turkic nobility of the first half of the 8th century AD.

Extensive archaeological studies showed that Mongolian memorial sites were not burial places for the class of ruling aristocracy. These sites are ruins of memorial temples constructed to commemorate the deeds of kagans and military leaders and the everlasting glory of the "Blue Turks" Until present, burials of Ancient Turkic kagans and other famous rulers have not yet been discovered. It is well known that many well-equipped expeditions were trying to find the burial site of Gengis Khan, but until present, all attempts have been fruitless. However, sacrificial procedures to commemorate Gengis Khan, who dreamed of conquering the world, are being served at a special site built 800 years ago (Bayar, 2001: 32). We note that further investigations of Ancient Turkic memorials are of great potential, especially if we take into account the sensational results of a recent Mongolian–Turkish expedition to the Bilge-kagan memorial in the Orkhon River basin.

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THE RAVEN, THE MISTRESS OF THE SEA, AND OTHER MYTHOLOGICAL CHARACTERS IN BOISMAN ART

Sources

Materials concerning the art of the Boisman Neolithic culture have already been published in this journal (Brodianski, 2001a). It was hoped that myths reflected in this art would be reconstructed (Ibid.: 65). Ongoing excavations at Boisman II site by the expedition from the Far Eastern State University headed by Popov (2000 – 2001) have yielded new finds which, for the first time, have made it possible to identify certain mythological characters and topoi. The reconstruction of prehistoric art hinges on the existence of something akin to the Rosetta Stone where one of the two languages is either known from numerical symbolism, records of myths, tales, songs, etc , or is interpretable in terms of astro-archaeology, comparable with previously deciphered archaeological sources, or is readable on the basis of ethnographic materials.

The bottom layer of Boisman II represents a seasonal fishing and hunting campsite on the ancient lagoon coast. Its age is estimated at 6500 – 5000 years, and its inhabitants fished and hunted land and sea animals (Popov, Chikisheva, Shpakova, 1997), and bred oysters (Brodianski, Rakov, 1996). They buried their kin at the same place. According to Chikisheva and Shpakova, they were Arctic Mongoloids somewhat similar to Reindeer Chukchi (Popov, Chikisheva, Shpakova, 1997: 79). Cultural traits, such as artificial cranial deformation and sea-based economy (sea mammal hunting, harpoons, models of boats), all agree with biological features indicating that these early Neolithic people were ancestors of the northern populations inhabiting the Peter the Great Bay coast. Accordingly, the reconstruction of Boisman art must be based on the mythology, folklore, and rites of the modern people of this area. This, however, does not preclude the use of Chinese, Korean, Japanese, and Amur mythologies.

The discovery of a two-sided petroglyph on a triangular plate made of dense gray Permian sandstone (Fig. 1, 2) was a breakthrough in the study of Boisman artistic imagery. The plate, 142 × 120 × 50 mm in size, is retouched along the margins, and each of its two planes carries two round bowl-like depressions produced by abrasion. One of the surfaces is divided by a natural curved ledge, 4 – 5 mm high (Fig. 2, 2). In the first publication (Brodianski, 2001b: 56 – 57), these triangular masks were not recognized as such, but later Kuznetsova, who studied the collection of artifacts from the cemetery on Ratmanov Island, Bering Strait, suggested that one of these (Fig. 1, *1*; 2, *1*) represented the Raven – the central character in Beringean mythology (Meletinsky, 1979). Indeed, the triangular mask with large round eyes, round forehead, and a robust sharp beak bears some resemblance to the wooden figurine of the Raven from Ratmanov Island and to similar representation on the shaft and bow of a drill from Ekven burial ground, Chukotka (Arutyunov, Sergeyev, 1975: fig. 52, *4*; 53, *2*).

On the opposite side (Fig. 2, *2*), there is a partitioned head of a wolf, and when the object is rotated at various angles, heads of a deer and a bear become visible in turn.

In terms of artistic device, the head of the Raven is paralleled by the polyiconic* pendant figurine made of boar tusk, and found on the platform of the secondary burial N 7 at Boisman II burial ground (this platform was exceptionally rich in artistic objects). The size of the pendant is 50 × 30 × 4 mm, and the diameter of the hole is 6 mm. If the object is inclined, the triangular ledge

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* The term "polyiconicity" was introduced by Fradkin (1970) with reference to previously neglected Upper Paleolithic figurines in which several representations were superimposed in such a way that by changing the aspect, one can see them in turn rather than together (Editor's footnote).

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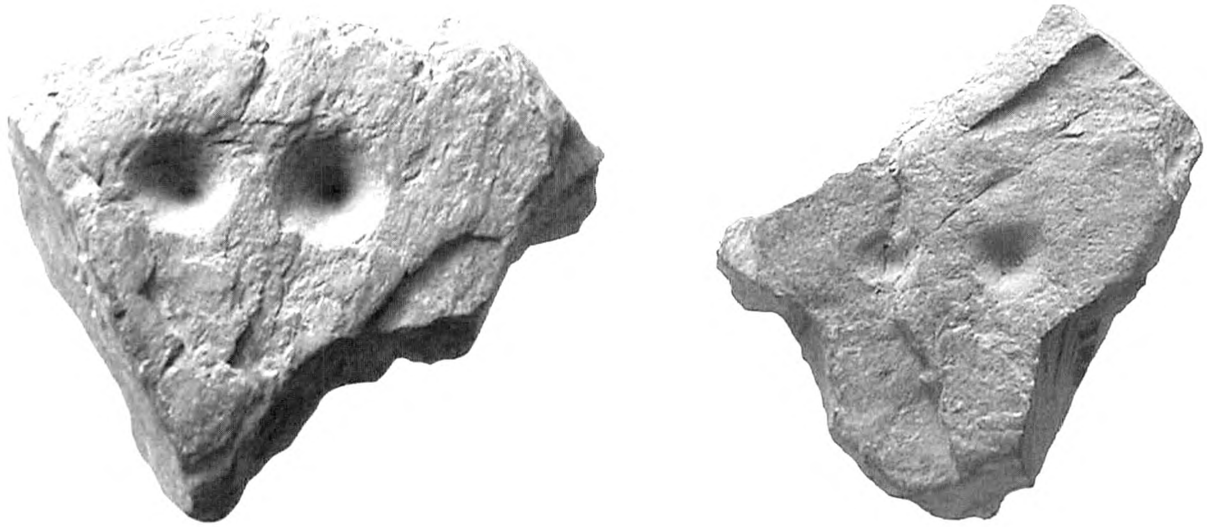

Fig. 1. Two-sided petroglyph. Sandstone. Boisman II.
1 – obverse, *2* – reverse.

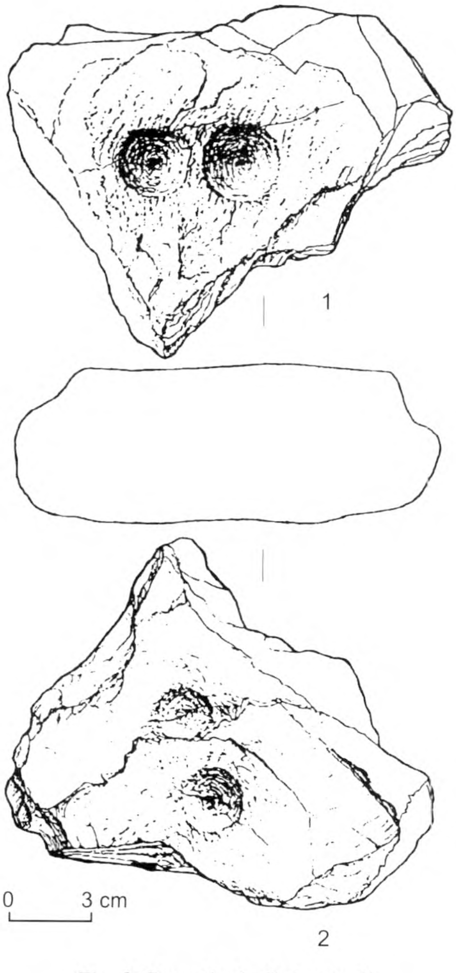

Fig. 2. Petroglyph. Boisman II.
1 – Raven, *2* – dismembered Wolf.

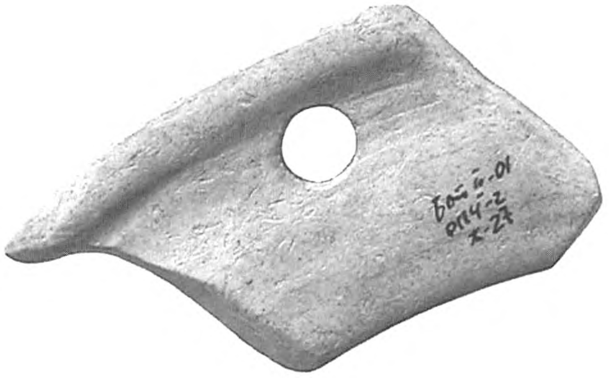

Fig. 3. Pendant representing the Raven.
Boar tusk. Boisman II.

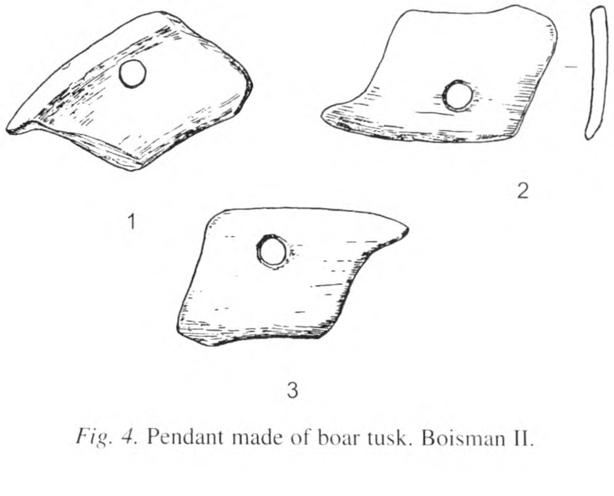

Fig. 4. Pendant made of boar tusk. Boisman II.

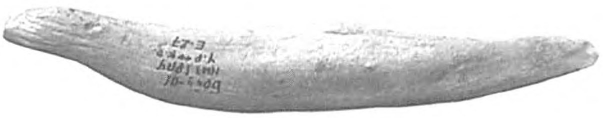

Fig. 5. Figurine representing an earless seal, made of an eared seal's tooth. Boisman II.
1 – Raven, *2* – boar, *3* – fish-dog.

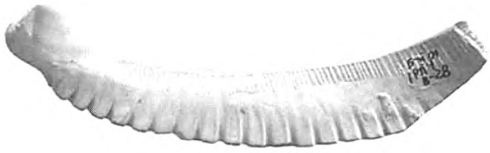

Fig. 7. Figurine representing a caterpillar (shell). Boisman II.

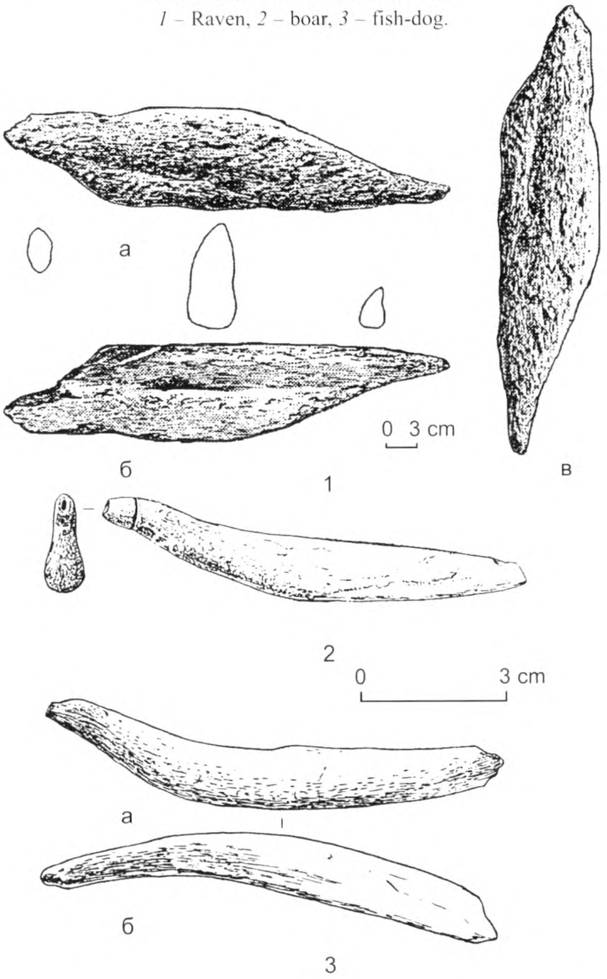

Fig. 6. Polyiconic figurines made of a whale's rib (*1*) and an eared seal's teeth (*2*, *3*). Boisman II.
1: *a* – earless seal, *b* – male hunchback salmon, *c* – hooded woman; *2* – eared seal; *3*: *a* – earless seal, *b* – whale.

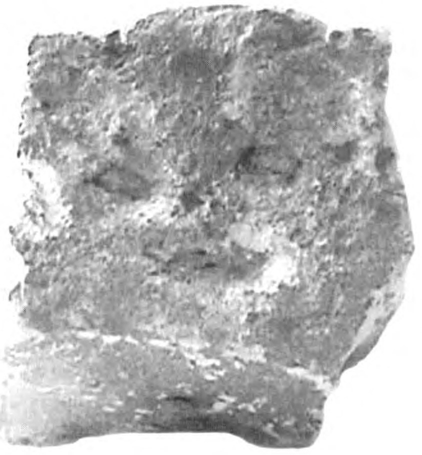

Fig. 8. Plate (tufaceous sandstone) representing a cat with a mouse. Gvozdevo III.

begins to resemble a beak, the opening turns into an eye, and the entire pendant is identified as a representation of the Raven's head (Fig. 3; 4, *1*). Two other aspects display a boar (Fig. 4, *2*) and a fish-dog (Fig. 4, *3*), respectively.

On the same burial platform, a pendant made of an eared seal's tooth was found. One of its aspects represents an earless seal (Fig. 5; 6, *3a*), and another one, a whale (Fig. 6, *3b*). In dwelling N 2, a similar representation of an eared seal, made of the same animal's tooth, was found (Fig. 6, *2*).

The combination of two images (a whale and a seal) on one figurine is present in a published specimen made of whale bone (Brodianski, 2001a: fig. 2, *2*). This same combination can also be seen on what is considered to be the best among such figurines (Fig. 6, *1*). It is made of a gray whale's rib, 400 × 90 × 42 mm in size. One aspect presents an earless seal (Fig. 6, *1a*), another, a male hunchback salmon (Fig. 6, *1b*), and the vertical one, a woman in a hood (Fig. 6, *1c*).

One more find, unparalleled so far, is a pendant or an open bracelet representing a caterpillar and made from the shell of *Anadara broughtoni* (Fig. 7), 70 × 13 × 2 mm in size. A modeled round head 8 × 8 mm and a natural edge of the shell render the insect in a realistic fashion. Earlier it was reported that jade representations of larvae had been found in Hongshan Culture sites, southern Manchuria (Alkin, 1995).

At Gvozdevo III, a Boisman site recently discovered by Popov near Expedition Bay, a plate made of a light tufaceous sandstone, was found. It measures 150 × 132 × 55 mm, its two sides (broad and narrow) are polished, and the broad surfaces carry small artificial depressions with traces of percussion. The stone is reddish-gray with several rusty spots, and white wherever the surface is damaged. Initially the plate revealed nothing particular, but after it had been washed, a distinct representation of a cat with a mouse in its mouth appeared on one of the broad surfaces (Fig. 8; 9, *1*). Sharp ears laid back, are rendered by polishing, and eyes, muzzle, and mouse, by percussion and paint. The animal is apparently a Far

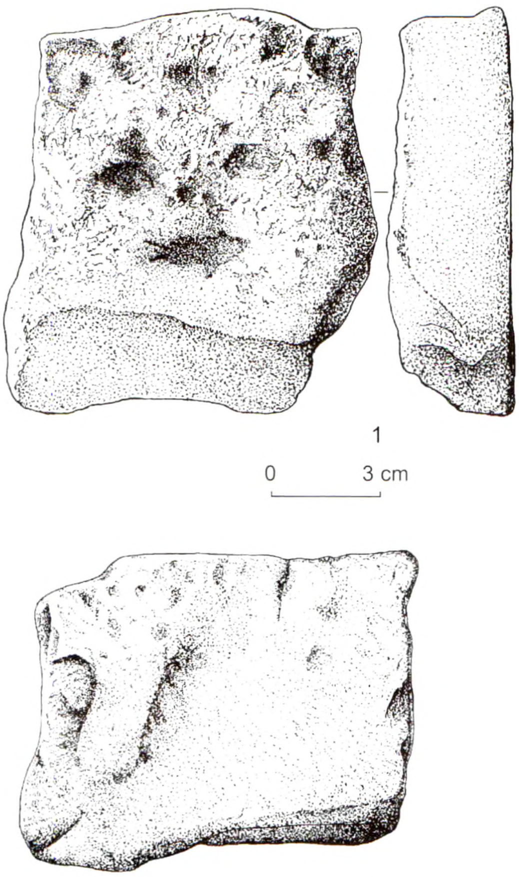

Fig. 9. Plate from Gvozdevo III.
1 – obverse: cat with mouse, *2* – reverse.

Eastern, or Amur, forest cat, *Felis euptilura Elliot*. It resembles the domestic cat, but is larger, 75 – 90 cm in length, the tail being 35 – 37 cm long. Its color varies from grayish-yellow to red with a shade of rust and there are two light stripes running from the eyes to the neck. Its distribution area includes the entire Primorye and the Khabarovsk Territory (Mlekopitayushchiye SSSR, 1965: 152 – 153; Redkie..., 1989: 209 – 210). The representation of a cat that has caught a mouse is unique in Neolithic art. Both temporally and spatially, the closest parallel is presented by a *dogu*, portraying a cat with a human torso and a three-fingered paw, from the Middle Jomon of Japan (Monuments…, 1973: photo 21). On the reverse side of the Gvozdevo plate, there is one more representation made by drilling, polishing, and percussion. If the plate is turned at 90° (Fig. 9, *2*), its left part reveals the open mouth of a leopard (diagnosed by Rakov).

Tentative analysis

A raven and a wolf from Boisman II, as well as a cat with a mouse and, possibly, a leopard, from Gvozdevo III, are the first images identified among the 19 portable petroglyphs of the Boisman Culture. The cat, realistically rendered, suffices to dispel the doubts concerning the artistic nature of stones with depressions. This is all the more likely because the utilitarian function of these artifacts has not been demonstrated so far.

It was more than once suggested that modern northeastern Asians as well as Eskimos, Aleuts, and Alaskan Indians had migrated from the south (Arutyunov, Sergeyev, 1975: 184 – 191; Meletinsky, 1979: 17). Biological and archaeological facts favoring the idea of a northward migration of the Boisman people along the Pacific coast have been greatly substantiated by a new series of finds including works of art, especially the representations of characters of the Raven myths. Tales about the Raven, the cultural hero, demiurg, and trickster, circulate both east and west of the Bering Strait. One of the popular tales is about the smart Raven (the Koryak *Kutkh*), who tore the wolf to pieces from inside. To do this, the Raven turned into a reindeer and scattered his dismembered body all along the road, where chunks of it were devoured by the wolf. Having done that, the wolf was torn into pieces (Meletinsky, 1979: 45 – 52). The same theme was recorded among the Chukchi (Ibid.: 22) and Eskimos (Ibid.: 103). If plane N 2 (see Fig. 2, *2*) is turned at 90° counterclockwise, a reindeer is seen, and if one turns it clockwise, one sees a bear. These animals, too, are featured in tales about the Raven, who played no less clever tricks with them. The Raven is not just a bird, but an anthropomorphous being, like his wife. If plane N 1 (see Fig. 2, *1*) is turned upside down, one sees a hooded human face. This may be the Raven's wife, who, according to Itelmen and Koryak tales, is much smarter than her husband (Ibid.: 47 – 51; Steller, 1999: 150 – 158). The two-sided petroglyph from Boisman II contains a whole range of images related to the Raven myths. On the Sheremetyev Rock, the Ussuri River, there is a representation of a Raven opposed to an ibis and a swan (Okladnikov, 1971: plate 118, *1*).

Parallels to the Boisman Raven are found not only in the north, but in the south as well. Among the paintings of burial vaults at Koguryo, Korea, there is a representation of a three-legged Raven on a solar disc (Frescos…, 1979: 65, 74 – 75). In Chinese mythology, ten suns carry ravens, so these are depicted on solar discs, and one of the constellations is that of the Sky Wolf (Yuan Ke, 1987: 37, 120, 145). On the Beysk stela, Khakasia (no later than the 3rd millennium BC), a large black Raven overhangs the reindeers (Devlet, 1990). In the Bible, Noah sends the Raven forth from the ark to see if the waters have subsided (Ibid.).

No less interesting is the combination of sea and land animals and a hooded woman on a single polyiconic figurine. Two other figurines, combining three images each (boar, seal, hooded woman, and boar, shark, hooded woman, respectively) have already been presented in publication (Brodianski, 2001a: fig. 3, *1*, *2*). The same combination is present in the largest figurine, made of whale bone. The only difference is that the land animal is replaced by a salmon (see Fig. 6, *1*). Several faces under triangular hoods are modeled in stone (Brodianski, 2001b. fig 1). In Eskimo legends, animals are dressed in parkas, and their human faces are covered with hoods. Having thrown the parka off, the animal turns into a human (Belchik, 2001: 189). In myths about the Mistress of the Sea (the Mistress of Animals), she is a woman who sends whales, walruses, seals, and fish to the people (Meletinsky, 1979: 86 – 87, 100).

The seal-and-whale couple (see Fig. 6, *3a*, *b*) possibly represents the theme of the seal bringing with him the whale, "the great guest" (Menovshchikov, 1959: 88 – 89). Alternatively, the seal can be the Raven's son who brings the whale with him (Meletinsky, 1979: 102). Generally, in the Far East, representations of seals are among the earliest since they occur in the Paleolithic and are common in the Malyshevo Culture, the Lower Amur (Medvedev, 2000), where they are related to phallic and solar cults. In Boisman II, two phallic figurines made of antler were found on the platform of burial 7 (see above), and they are also present among the artifacts from burials 2, 3, and 5. A phallus-shaped pebble was found atop the shell mound above the first burial ground as well.

While the cat does not feature in northern myths, its prey, the mouse, is quite common in the Raven tales (Meletinsky, 1979: 31, 43 – 44, 47, 52, 69, 86, 91, 100). In fact, mice manage to fool and defeat the Raven.

In Chinese mythology, one of the fantastic animals is the green cat (Yuan Ke, 1987: 197).

The invertebrates featured in the Raven cycle are spiders, mosquitoes, and lice (Meletinsky, 1979: 43, 49, 117) The caterpillar, then, could well have been among these creatures at the evolutionary stage reflected by Boisman art.

Overall, artistic objects of the Boisman Culture discovered in 2000 – 2001 support the idea that Boisman people, or their descendants had migrated northward. The previously unknown representations of the Raven provide a clue to the relationship of this tradition with Beringean mythology.

I am thankful to N.A. Kuznetsova, who has identified the Raven representation, and to L P. Khodzevich, who has made all the drawings and photographs. My thanks are due to G.M. Weinger, A.E. Kuzin, and V.A. Rakov for the attribution of animal representations and for consultations, to M.D. Ryazantseva for the identification of rocks, and to A.N. Popov, S.V. Batarshev, and O.L. Moreva for their help in collecting the materials.

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THE METAL AGES AND MEDIEVAL PERIOD

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WEST SIBERIA AND THE WORLD OF MEDIEVAL CIVILIZATIONS: HISTORY OF INTERACTION ON THE TRADE ROUTES*

Introduction

The history of medieval northwestern Siberia has been traditionally reconstructed on the basis of archaeological materials. Written sources have been used only for testing certain hypotheses and they are very scanty, which may explain the situation to some extent. In fact, there are a few brief mentions of Yugra, which may be either northeastern Europe or northwestern Siberia, in *Povest' Vremennykh let* (12th century Kievan chronicle) and in Novgorodan chronicles, as well as vague descriptions of northern marvels from Arab sources. Finally, there are Old Icelandic sagas mentioning a mysterious and so far unlocalized Biarmia, but none of the competent scholars has used them with reference to events in medieval West Siberia as yet. Due to the paucity of written evidence and to the insufficiency of archaeological records concerning northwestern Siberia (in terms of number of publications, especially integrative ones), certain stereotypical ideas have formed in historiography. Many of these concern cultural and trade ties of West Siberians with their close and distant neighbors. This, for instance, refers to the belief that 11th – 13th-century fur trade with the North was monopolized by Novgorod, and that the Novgorodans had, at that time, even penetrated as far east as the Trans-Ural regions. Another stereotypical idea is that trade with northern peoples was "mute", meaning that the merchant and the purchaser (or rather the two participants of barter) did not communicate directly. These and similar beliefs stem from the traditional views concerning the "backwoods" nature of West Siberian cultures, which allegedly began to form the benefits of world civilizations only after having been annexed by Russia. As the archaeological studies of the recent decades demonstrate, this view is utterly erroneous.

The problem

Nothing hampers research more than do hardened beliefs regarded as axioms. I would like to contribute my mite to the shattering of stereotypes, first, by suggesting a more realistic picture of interaction between various cultures and peoples on the trade routes of northeastern Europe and northwestern Siberia; and second, by showing that the notion of "mute trade" is irrelevant in terms of either period or territory. The time-span to be covered is AD 900 – 1300.

Novgorodans and Yugra: Aspects of relationships based on written sources and archaeology

I would first like to stress that I am not going to take part in debates concerning the whereabouts of the Yugra mentioned in the chronicles (hereafter the term "Yugra" is used with reference to both the territory and its inhabitants). Attempts at pinpointing the places referred to by medieval sources may prove futile after all, as evidenced by a long-lasting and ongoing discussion around the Yugra of Russian chronicles, or Visu and Yura referred to by Arab geographers, or Biarmaland of the Old Icelandic sagas. The principal

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factors to be taken into account are: (a) medieval mentality tending to amalgamate literary stereotypes, religious or mythological themes, trustworthy evidence, and ideas concerning the inhabited space and the time required to cross it; (b) archaeological data supporting or disproving existing hypotheses; (c) the practice of giving old names to "newly discovered" lands, as was the case with the name "Siberia", when Russian troops, moving further and further east, extended the territory to which this name referred up to the Pacific coast. Let us assume that Yugra was situated in northeastern Europe and, as the Novgorodan troops were advancing eastward, its borders probably shifted, eventually encompassing a portion of northwestern Siberia.

Yugra was first mentioned in the chronicles in connection with the famous story told by a Novgorodan called Gyuryata Rogovich. It was recorded by the annalist in Ladoga, and included in the *Povest' Vremennykh Let* under 1096. Shakhmatov (1940: 25 – 26) claimed that the fragment was an interpolation from the second edition of *Povest'*, composed around 1117. Aleshkovsky (1971: 12) dated it to 1119 The story is well known and has been cited more than once, making it unnecessary to relate it again in full. Notably, Gyuryata sent his servant to Pechora, "to the people paying tribute to Novgorod." I believe that the tribute was not paid on a regular basis; more likely, this was done occasionally, after some successful military operation undertaken by the Novgorodans. Having visited Pechora, the servant set off "for Yugra; and Yugra are people speaking an incomprehensible language, and they *border* Samoyad in the northern lands... And the Yugra *told* my servant..." (Polnoe sobranie..., 1848, vol. 1: 107) (italics added). What can one infer from this passage? First, the Yugra and the Samoyad bordered each other "in the northern lands", that is, lived side by side, but the text gives no reason for placing Samoyad north of Yugra, as is often being done. Second, although the Yugra speak an "incomprehensible language", the servant did somehow understand it, as it also follows from the further text, relating the story of the "marvel", told by the Yugra. Third, because the annalist tries to pinpoint the Yugra relative to the Samoyad, the whereabouts of the latter must have been known to him.

The next mention of the Yugra and Samoyad is found under 1114: "Also, people in olden times traveled across Yugra and across Samoyad, and they saw these themselves in the northern lands..." (Ibid., 1848, vol. 2: 5). This is followed by a fairy tale about a cloud from which squirrels and reindeer fell, "as witnessed by the Ladogan governor Pavel and all the Ladogan people" (Ibid.). The passage contains no new information about Yugra and, like the first one, it was recorded in Ladoga.

The next mention of Yugra is in the first Novgorodan chronicle under 1187: "In the same year, some collectors of tribute from the Pechora and Yugra were attacked in Pechora, others beyond Volok, and about one hundred warriors were killed" (quoted after (Dmitriev, 1893: 49 – 50)). It follows that the unsuccessful attempt to collect "tribute" was undertaken by a party of over one hundred men (given that 100 were killed). The chronicle does not say whether these people had reached Yugra.

Next, under 1193, the same chronicle gives the most detailed account of a misfortune that befell a Novgorodan detachment in Yugra. This was a famous, albeit not a glorious, operation undertaken by Yadrey with his army In brief, Yadrey captured one of the towns in Yugra and approached another one. The Yugra, having promised to offer silver and sable fur to the Russians, assembled a host instead and, with the help of a certain Novgorodan named Savka, enticed Yadrey with his bravest men into the town and slaughtered them all. Savks's special request to the Yugran prince was to kill a certain Yakov Prokshinich lest he should bring a new army from Novgorod and take revenge. It took the eighty men who survived the massacre the whole winter to reach Novgorod with enormous difficulty. Having arrived, they killed three men who had been Yugra's allies (Ibid.: 51). The fragment contains some data relevant to the situation. First, despite the mention of tribute paid by the Yugra, the Novgorodans needed sizeable forces to deal with them: some one hundred were killed, and at least eighty survivors reached Novgorod. Second, the tribute Novgorod received from Yugra consisted of sable fur and silver; apparently imported silver works of art are implied because silver was not mined anywhere in this area. Third, it appears that contacts with the Yugra were maintained not only by the official Novgorod, but also by some private persons, such as Savka and the three men killed in Novgorod, who evidently wished to avoid any competition, even with their compatriots.

While not a single military Novgorodan operation in Yugra was noted in the 13th century, two unsuccessful campaigns took place in 1323 and 1329. Both times, the Novgorodans were defeated by the Ustyug people. Before 1364, not a single successful operation in this territory was mentioned. In my view, this attests to the fact that in AD 1000 – 1200 Yugra was not included in the Novgorodan sphere of influence, let alone paying regular tribute. Also, expeditions across huge territories inhabited by people less than friendly to Novgorod were highly dangerous and the profits seldom outweighed the losses. Khoroshkevich (1963: 51), in a book addressing Novgorodan trade in 1000 – 1400, writes basically the same: "A comparatively small amount of sable fur in

Novgorodan export suggests that the ties between Novgorod and Pechora were weak, because among the European territories, Pechora was virtually the only one where sables were abundant."

If, as many researchers believe, the contacts between Novgorod and the northern territories both east and west of the Urals were close, do any archaeological facts document these ties? These facts must be few, because only metal, glass, clay or, less often, bone artifacts are preserved in cultural deposits. Some ancient finds from Komi were imported from northwestern Russia, specifically Novgorod. Most of these are small bronze and, less often, silver ornaments, such as spherical bells, certain types of pipe-shaped beads, hollow horse-shaped pendants, crescent-shaped earrings, and finger-rings (Arkheologiya Respubliki Komi. ., 1997: 597 – 600). Certain iron artifacts found on the Vym' sites may be Old Russian, too. The Novgorodan import to the region, which is now Komi, might have included cloths, from which nothing has remained. In other words, all artifacts imported from Novgorod or other northwestern Russian centers were mass produced – nothing to be compared with goods imported from regions such as the Volga Bulgaria or the Upper Kama Basin in terms of either quality or quantity.

East of the Urals, traces of such contacts are even more scanty. Most of the 24 items, which Mogilnikov (1987: 340, plate XCII) regards as "Russian import to the Ob area or local replicas" are either uninformative as to origins (iron axe and steels), or are indeed local replicas (cast pendants with imitated granulation) or had reached the Ob area via the Volga Bulgaria (beads, twisted bracelets, and a finger-ring with Bulgarian nielloed plaque). The least disputed items so far included a sword found at Preobrazhenka III, Chany District, Novosibirsk Region (Molodin, 1976: 125 – 127), and a Byzantine bowl from Berezovo with an Old Russian inscription dating from the 1100s. The sword was found far south of the area in question, making it difficult to reconstruct its way from the place of manufacture to the West Siberian forest-steppes. In any event, it has no direct bearing on the issues discussed here. The bowl, indeed, was purchased in 1867 in Berezovo from a person belonging to a family that had migrated from Nizhni Novgorod (Sokrovishcha Priobya, 1996: 142). How and where the bowl was found, is not known. Neither do we know how and where the inscription was made. The find, then, may hardly be regarded as unambiguous proof of Russia's trade with West Siberia in the 12th century.

Based on the chronicles, it can be suggested that the Novgorodans were attracted to the northern territories east and west of the Urals. Novgorodan merchants who maintained trade relationships with foreign countries needed goods that they might procure only in the north. These included primarily fur (squirrel, sable, marten, silver and red fox, ermine, beaver, polar fox, etc.) The most valued fur was sable, an animal which, unlike the related marten, is found mostly in Siberia. Its distribution area west of the Urals included the Upper Pechora (Sobol..., 1973: 25). In 1400 – 1600 sables lived all over the forest zone of the Ob area (Monakhov, 1995: 26). While inhabiting nearly all geographical zones of the North, including sub-tundra and forest-tundra open woodlands, and northern taiga, they prefer central and southern taiga, especially dense pine forests (Sobol .., 1973: 12). Evidently, the conditions for sable hunting in Pechora and Yugra were especially favorable from the late 1st – early 2nd millennium onward. Judging by paleoclimatic evidence, the summer temperatures in sub-arctic areas of the Urals and Siberia were increasing over the period of AD 700 – 1300, causing the northward shift of the border between forest and tundra (Vaganov, Shiyatov, Mazepa, 1996: 17). There is no information concerning sable hunting before 1500, but the amount of fur procured may be roughly assessed on the basis of indirect data. Thus, in 1586, West Siberians had to pay a tribute of 200 thousand sables (Monakhov, 1995: 27); during the rule of Alexey Mikhailovich (1645 – 1676), the number of sable skins shipped from one of the staging posts in Archangel, was 23,160; apart from that, 18,742 tails and thousands of other parts are mentioned (Sobol .., 1973: 144). Clearly, this was by far above the demand, so restrictions on sable hunting were introduced in the late 1600s. These figures explain why Yugra attracted the Novgorodans.

Apparently, northern and circumpolar regions of the Urals were the place from where hunting birds, such as falcons, were exported Kutepov (1896) notes that the best hunting falcons were brought from the circumpolar Urals. They were highly valued at the courts of Russian grand princes and other European monarchs, and they were exported from Novgorod by foreign merchants despite transportation difficulties (Khoroshkevich, 1963: 158). Generally, falcons were valued throughout medieval Eurasia, from China (Sheffer, 1981: 131– 135) to Britain. From the 9th century on, falcon hunting was becoming one of the most popular themes in Islamic art from Khorasan to Moorish Spain.

These were hardly all the goods that made northeastern Europe and West Siberia attractive for the merchants. One should probably add mammoth and walrus tusks, walrus skins, castoreum, cedar nuts, etc. Given the above, the Novgorodans' attempts to reach these areas, despite persistent failures, are easy to understand. Nothing indicates, however, that the northern fur trade was monopolized by Novgorod, and it is likewise highly unlikely that "from the late 1100s onward, the Novgorodans were beginning to settle in Yugra, forming something similar to trade factories" (Mogilnikov, 1987: 215).

The Yura of the Arab sources: Archaeological evidence of trade along the "Fur Route"

Northern trade begins to be mentioned by Arab sources in East Europe from the 10th century on (Ahmad ibn-Fadlan), possibly even earlier (Zakhoder, 1967: 59). These sources contain the first descriptions of the so-called "mute trade" where the participants of barter allegedly do not see each other. These descriptions refer to territories variously named Visu and Yura. As I have said, I will not try to pinpoint these territories. I will just mention that Yura is often believed to be the Yugra of the Russian chronicles (Puteshestvie..., 1971: 101 – 105). It is quite probable that Visu was situated somewhere in the Upper Kama region, whereas Yura might lie north or northeast of it (Fedorova, 1984: 12). Ibn-Fadlan mentions that sables and silver foxes were brought from Visu (Kovalevsky, 1956: 138). More northern peoples are not mentioned. According to ibn-Fadlan, north of Visu lived the fantastic Yadzhudzh and Madzhudzh, who had been forced to live there by Alexander the Great (Ibid.: 138 – 139), a theme rather typical of medieval scholars both Oriental and Western (in the Russian chronicle, these characters are called Gog and Magog from Japheth's generation). In the 1100s, the descriptions become more realistic. Al-Marvazi, in his compilation named *Mental Capacities of Animals*, written ca 1120 – 1121 (Zakhoder, 1996: 327), writes, "At a distance of twenty days of travel from them (Bulgars) in the northern direction, there is a country named Isu, and beyond it live people whose name is Yura" (Zakhoder, 1967: 61). Al-Garnati, too, writes, "...and beyond Visu, on the Sea of Darkness, there is a land known as Yura" (Puteshestvie..., 1971 32). He also describes the stepwise trade with the northern peoples: "...the swords are brought from the lands of Islam ... then the Bulgars bring them to Visu . . then the people of Visa bring them to Yura..." (Ibid.: 34). Finally, there is a passage from a text by the famous 14th-century traveler ibn-Battuta, who had visited all the Islamic countries, but used reported information when describing the remote northern lands. The passage is about "mute trade": "...travelers make a stop in the Land of Darkness, lay out the goods they have brought, and go to the place where they stay. In the morning, they return to the place where they have left their goods, and find sables, squirrels, and ermines, brought in exchange. If the merchant is satisfied with the deal, he takes the furs with him, otherwise he leaves them where they are, together with his own goods. On the next day, local people bring more furs, and the merchants take them, leaving their goods in exchange. This is the way they trade. Those who come there, do not know with whom they trade – whether these are humans or spirits; they see no one..." (quoted after (Istoriya..., 1999: 18)).

The goods imported to, and exported from, the North are inadequately covered by available sources, because those who wrote about northern trade mostly focused on northern exotics, whereas merchants who might give a more detailed account, have left neither documents nor memoirs, and of all the things they related, the writers gleaned only what might interest a medieval reader. Among the items of trade, mostly furs are mentioned, and possibly they were indeed the principal equivalent. Some sources refer to "ivory", perhaps implying mammoth and walrus tusks. Al-Garnati mentions male and female slaves. The imported items included arms ("swords from the lands of Islam" according to al-Garnati), clay, glass, and crystal beads, and cloths. One of the graves at Saygatinski III burial ground contained a piece of woolen carpet together with remains of something that might have been delicious food and incense (Zykov et al., 1994· 67). However, the principal items of export to the northern markets, at least in terms of preserved objects, were silver vessels, silver ornaments, and silver details of clothing According to most scholars, the import of silver to the Kama region began in the 800s and was prompted by the fact that huge amounts of Sasanian and Sogdian silver had stopped to circulate after the Arab conquest of Iran and western Central Asia. In the Kama basin, more than 100 hoards were found, each containing more than one silver vessel (Darkevich, 1976). Evidently, works of art, decorated with motifs alien to Islam, were bought by merchants for their scrap value, making it highly profitable to exchange them for precious furs. Understandably, al-Garnati does not mention this item of "export" to the North. in the 12th century, silver was no longer exported on a large scale due to the "silver crisis" in the Near East. Incidentally, it is quite likely that all this tremendous amount of Sasanian and Sogdian silver works of art was brought to the Kama basin during a very short period following the devastation of western Central Asia by the Arabs, and was part of the spoils of war However, very soon after the emergence of the first Muslim states in Iran and western Central Asia, their rulers found it prestigious to derive their genealogies from the Sasanids. Most likely, the silver Sasanian vessels had become a rarity by that time, and their export had been greatly reduced.

Oriental silver works of art first appeared in the Ob region around the 10th century, later than they had reached the Kama. This is why the objects found in the Ob area are different. They include Iranian silver vessels made in 800 – 1100, Bulgar silver objects manufactured in 900 – 1400, examples of the Golden Horde toreutic art, etc. (Fedorova, 1984; Kramarovsky, Fedorova, 1991; Zykov et al , 1994). We will not touch upon the ways, which West European and Byzantine silver vessels made in late 1100s – early 1200s reached northwestern Siberia. The stepwise nature of trade mentioned in the written sources is well documented by the composition of import in West Siberian burial grounds and hoards: objects brought from far-off places are supplemented, as it were, by those manufactured by Bulgar jewelers and Kama artisans (Zykov et al., 1994: 66 – 67).

Such a developed trade having a longstanding tradition makes it unlikely that any deals were "mute". Merchants were well aware of the demand and capacity of the northern markets, even though this information might have been relayed stepwise. Bulgar jewelers, as I have written more than once, were perfectly informed not just about the material demands of their northern purchasers, but about their ideological demands as well. Motifs of representations on dishes and plaques were ideally suited to meet the northern people's tastes. In fact, certain precious ornaments, such as numerous silver palmate pendants with granulation and filigree, especially those found in Saygatinski III and IV burial grounds and dating from 1100 – 1400 (Ibid.: 108), were doubtlessly made to order

Our review of Arab sources concerning trade with the northern people, and archaeological evidence thereof, strongly suggests that, in AD 800 – 1400, this trade flourished, making the tales of the "mute barter" utterly untrustworthy. These stories were apparently included in many accounts to make these more readable for the medieval public and possibly to scare away potential rivals.

Trade along the Northern Sea route: The problem

Al-Marvazi's work, already mentioned, contains a passage which, unlike other parts of his book, has been ignored by later writers: "Beyond the land of Yura live the coastal dwellers, who sail without any need or purpose, just to glorify themselves by saying, 'look, we have reached this or that place.' They are people marked by an extreme degree of stupidity and ignorance. For instance, should they sail across the sea, and should two of their ships meet, the sailors tie both together, draw their swords and fight; and whoever wins will own both ships. Further off there is Black Land, and in the sea, there live fishes whose teeth are used for making various things like dagger hilts, etc." (quoted after (Zakhoder, 1996: 297)). Zakhoder does not comment on this passage, except by noting that while al-Marvazi's text is an abridged version of the texts by ibn-Ruste and Gardizi, "Marvazi's description of peoples named Isa – Yura is original and largely unique" (Ibid.. 327). The story looks rather strange in the context of other stories describing commercial successes of Arab merchants and the remote places they had seen. The aversion the writer feels for the people "sailing without any need or purpose", and the marked realism of his description, are paralleled by another passage, by Ibrahim al-Tarushi of Cordova, conveying his impressions of the trade fair in Hedeby, Denmark, specifically of the way the local people sing: "Never have I heard such an abhorrent singing, their throats emit a howl much alike that of the dogs, except by being even wilder". Interestingly, even the fantastic Yadzhudzh and Madzhudzh, forced to live in the north by Alexander the Great, were less repugnant for the Arab writers. Could al-Marvazi have described people whom he knew well? If so, he might have implied Norse sailors, who ventured out on much more distant and complicated voyages than previously believed. "It is known from reliable sources that around AD 970, the Norse Konung by the name of Harald the Grey Skin reached the mouth of the Severnaya Dvina by Sea" (Glazyrina, 1996: 41), and the last voyage of the Vikings to the east or northeast (to Biarmaland) was undertaken in 1222 (Ibid.: 38). Al-Marvazi, who wrote his book in the 1100s, might well have been aware of these travels, the more so that Scandinavian merchants are known to have visited the trade fairs in Bilyar and Bulgar. According to some writers (Ivanov, 1998· 139), Norse artifacts in the Borre style, found at certain sites in the Upper Kama basin (Belavin, 2000: 154), might have arrived there via the Volga Bulgaria (Ivanov, 1998. 139).

Northern Russian sailors, specifically those from Novgorod and Ladoga, might also be considered "sailing without any need or purpose", although written sources dating from that period do not mention any voyages undertaken by the Novgorodans. Researchers distinguish two peaks in Novgorodan shipbuilding activities: 900 – 1100 and 1200 – 1400. "The earlier period coincides with intense contacts with Scandinavia and probably migrations, and the later with the economic heyday of the Novgorodan Republic and related increase in trade including the foreign one, as well as with the opening up and colonization of vast northern territories" (Dubrovin et al., 2001: 158).

Evidently, the trans-Uralian (West Siberian) people had long been familiar with boats and were skillful riverine navigators. The first reliable evidence for the use of hollowed-out boats dates back to the late 1000s. Toy boats from the cultural layer of Yarte VI settlement in Yamal and burials in boats at the Zeleny Yar burial

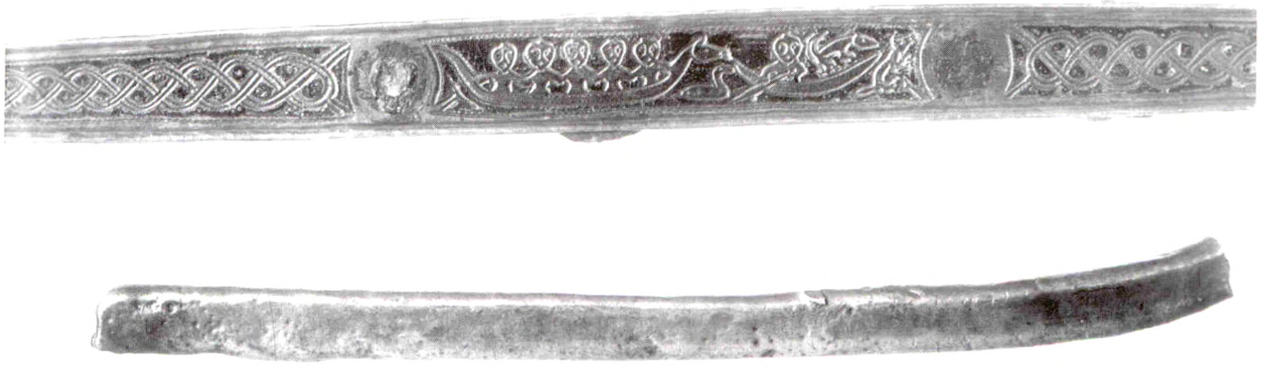

Fig. 1. Bulgar silver headring with a representation of a boat.

ground near Salekhard make it possible to reconstruct their appearance. Archaeological observations agree with certain themes of Ob Ugrian heroic tales describing the heroes' distant military expeditions. In some tales, boats are mentioned: "They got into a boat of deep draught with a submerged stern, in order to row with an oar having a finger-like rowlock" (Mify..., 1999: 145), or "Like an otter with a pointed body, he [the hero] wiggled in his deep-draughted boat with a submerged stern, side to side did he wiggle to show all the devices, all sorts of tricks" (Ibid.: 147), or "Both princes lower their oars at the bow and raise them at the stern" (Ibid.: 151). Some much later sources (17th-century petitions) contain information concerning the assaults of the "criminal Samoyad" on Russian troops. The Samoyad usually destroyed the koches (deck vessels with sails and oars) and took away whatever they were able to take, so that "animals, seines, nets, boats, cauldrons, anchors, and sails were taken away, and the koches were chopped to pieces" (Ocherki istorii Yugry, 2000: 167).* The koches might have been destroyed for two reasons: first, the West Siberians did not know how to navigate large vessels, and second, koches symbolized the strength of the Russian administration. The first suggestion appears more likely.

A large boat is represented on a 12th-14th-century Bulgar silver headring found in 1876 somewhere on the Irtysh (Sokrovishcha Priobya, 1996: 102, 103) (Fig. 1). The ornament itself is not unique. Another headring, decorated with a herring design against a nielloed background, was found in Saygatinsky IV burial ground (Kramarovsky, Fedorova, 1991: 22). Nine such ornaments (five intact, four fragmented) were found in West Siberia. Silver head rings shaped like ribbons with narrowed ends are typical of West Siberian sites spanning the period from mid-2nd millennium to the 19th century. Doubtlessly, all of them were made by Bulgar artisans either to order, or at least with a view to satisfy the tastes of West Siberian clients. The central part of one of the head rings bears a unique representation of two boats (see Fig. 1). One boat is small. Inside, there is a man with an oar, and a dog sitting on the bow. In front of the boat, there is a fur animal and a fish of which only the tail is visible; and at the stern there is a water bird. Behind, there is another boat. It is large, its bow and stern are of the same height, the bow is decorated with a sculptured head of an animal, and on the stern there is something, which might be a rudder or part of the herring design. Inside the boat, there are five men, hands joined. There are neither oars, nor a sail. People have pointed heads, and stylistically resemble those shown on plaques representing horsemen surrounded by fur animals, dogs, and water fowl. Some plaques were evidently made by Bulgarian jewelers belonging to the same school as those who manufactured the head ring in question (Ibid.: 7). While the interpretation of the composition with a boat is a complex matter, and may hardly be adequate at present, the fact that this composition decorates an ornament made for a West Siberian client deserves attention.

In my view, it would be justified to address the Viking sagas mentioning the journeys to Biarmaland. The whereabouts of this place is disputable. Some writers locate it in the Kola Peninsula, others in the Northern Dvina. I believe that the debate is meaningless, and I agree with Glazyrina, who writes:

> Possibly, the name 'Biarmaland' referred to the furthermost margin of the inhabited territory. This was the ultima Thule, a borderland between the

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* I thank E.I. Vershinin who drew my attention to this fact.

real world and the legendary one. This is precisely what one of the geographers writes: "Beyond Biarmaland lies an uninhabited land" (1996: 43).

Moreover, it may be assumed that over 300 years of journeys to Biarmaland, the borders of this ultima Thule were shifting in the eastern or northeastern direction, toward the undiscovered territories. This is close to Glazyrina's opinion, except that in her view, the border shifted from the Kola Peninsula to the Northern Dvina (Ibid.: 40 – 41), whereas I venture to suggest that the Scandinavian sailors might have reached even more eastern territories, more so that the warm climate in the late 1st – early 2nd millennium favored journeys along the northern sea route.

Perhaps the most detailed account of a journey to Biarmaland is found in Snorri Sturlusson's *Orbis Terrarum*. In brief, the plot is as follows. Konung Olav sends his men, brothers Karli and Gunnstein, on a trade expedition to Biarmaland. A pool is arranged whereby each of the two parties (the konung and the brothers) owns one half of the goods and of the profits. A merchant ship is equipped, with a crew of 25. The plan comes to the ears of a certain Thorir the Dog, who owns a battleship He thrusts himself upon the brothers and becomes their companion, after which he launches his battleship with a crew of 80. In Biarmaland, they begin by very successful trading and gain "a big fortune" consisting of squirrel and sable furs. When the barter is over, the Norse loot the sanctuary of the local deity, stealing the silver vessels, coins and ornaments. We omit further details, although some may be noteworthy for a historian. The most important things for us are these. First, "having reached Biarmaland by sea, they stayed at a trading place" (Ibid.: 204). Second, "when the deals had ended... it was announced that the armistice with the local people ended as well" (Ibid.). The text implies that there existed certain trade centers, in some way similar to the international trade fairs. Such trade fairs have been thoroughly studied in northwestern Europe as well as in Volga Bulgaria, Bilyar and Bulgar, which were visited by Scandinavian merchants; this, incidentally, was the region where the head ring with a representation of boats was manufactured. Evidently, trade centers must have existed wherever such trade was practiced, including northeastern Europe, and the territory east of the Urals. Third, the person who showed the Norse the way to the sanctuary was Thorir the Dog. It was he who told them how the treasures had arrived at the sanctuary, what might be stolen, how the sanctuary was guarded, how to misdirect the pursuers, etc. Most likely, although Thorir the Dog preferred not to announce this, he had visited Biarmaland before, otherwise it is hard to understand where he had gained such accurate knowledge of local religious practices and specific rites. For the Vikings, journeys to Biarmaland were an affair that might have glorified them for the rest of their lives, so those who had taken part did not conceal it. On the contrary, they were proud of it. The situation is somewhat akin to the Novgorodan one: there were officially organized troops, which carried out operations in Yugra, and these were recorded as glorious deeds by the annalists; on the other hand, certain persons pursued their own secret business with Yugra, and only tiny bits of information about them can be found incidentally among the reports of the official expeditions. Finally, Sturlusson's account of Karli's, Gunnstein's and Thorir's journey to Biarmiland contains a description of their ships. There were two: a merchant ship, likely of the knorra type, with a small crew of oarsmen, and a large battleship with a crew of up to 60 – 80 rowers. Vessels of these types were able to cover large distances in the open sea as well as to ply coastwise, enter comparatively shallow rivers, and moor virtually anywhere. Nautical properties of Norse vessels are well known, and thanks to them, marvelous geographical discoveries were made from Iceland to America. In other words, the Vikings were quite able to undertake distant journeys along the coasts of northeastern Europe and even West Siberia. However, can any evidence of these journeys be found in archaeological materials?

Generally, strange as it may sound, contacts between the Norse and people living east and west of the Urals have for some reason been neglected since the mid-50s, when the study by Bader and Smirnov (1954) was published. All facts concerning western trade links of the northern Uralians and northwestern Siberians were interpreted in such a way as if "western" meant "Novgorodan". Only the recent book by Belavin (2000) contains some considerations as to whether the Circumuralian merchants could have visited the Baltic countries or otherwise. Some Scandinavian artifacts were found far eastward of the places of their manufacture. Thus, an oval Scandinavian fibula is in the possession of the Yamal-Nenets District Museum (Sokrovishcha Priobya, 1996: 164). The fact that such finds are unique does not make the problem of contacts meaningless. In fact, finds of this type cannot be numerous since the principal items exported by Norse artisans were cloth and iron artifacts, which tend to decompose in archaeological deposits. That the contacts existed, is evidenced by mythological and folklore themes (Golovnev, 2001: 35), and by certain unusual motifs in the art of medieval Uralian and West Siberian masters. These motifs cannot be entirely local (Fedorova, 1984). A good example, although not the only one, is provided by the heads of bimetallic steels. In West Siberia alone about a dozen of them were found, including four in which the theme of one or two ravens is used (Zykov et al., 1994: 89 – 90; Semenova, 2001: 179). At least one specimen represents an animal with a head turned back and mouth wide open (Zykov et al., 1994. 91), resembling representations in the "ringerike" style. Because it is possible that all these artifacts were made by West Siberian craftsmen, Scandinavian motifs or devices could have been adopted only by means of direct contacts.

All the facts outlined in this section provide a basis for further interpretation, rather than for any definite conclusions. The evidence is still insufficient, but we should continue to analyze the ethnic relationships in North Europe and northwestern Asia. In addition, the next period, spanning the late 12th – 13th centuries, demonstrates a rather unexpected picture of direct trade links between northwestern Siberia and West Europe.

West European works of art in the northern Ob basin

In the mid-1980s, collections owned by the district museum in the village of Muzhi, Priuralsk District, Yamal-Nenets Autonomous Region, were supplemented by a hoard consisting of four bowls without lids and two lids from other bowls. One bowl had been made in the Byzantine Empire (Sokrovishcha Priobya, 1996: 149 – 161) (Fig. 2), and three in northwestern Europe (Ibid.: 165 – 197) (Fig. 3 – 5). All four vessels were exhibited at the State Hermitage (St. Petersburg) in 1996 and subsequently in foreign museums, where they were deservedly admired. Two more West European vessels, or rather a bowl without lid and a lid from another bowl found in the Ob region, have been owned by the Hermitage since the mid-1800s. Their exact provenance is unknown. The sixth West European vessel of this type was found at the Lower Ob region (for some time it was exhibited in Paris among other things from the Basilevsky collection, and subsequently transferred to the Metropolitan Museum, New York). All vessels are so similar that they must have been produced at the same center, or at different but very close centers. Moreover, all were found in roughly the same part of the Lower Ob basin. Evidently, they had been taken there by the same ship. The alternative explanation, that West European silver nielloed bowls, which are unique even in European and American museums, were imported to northwestern Siberia on a regular basis, appears utterly implausible. In the introduction to the Catalogue of the Exhibition *Treasures of the Ob*, Marshak cites a story from *Lives of the Minstrels* describing the generosity of "the young King Henry", brother of Richard the Lion-Hearted. A poor knight once saw a lid from a silver bowl and thought, "If I manage to steal it, then for many days will my relations be well provided for"', so steal it he did. There follows a sentimental story of the generous king, who not merely allowed the poor knight to keep the lid, but gave him the bowl as well (Sokrovishcha Priobya, 1996: 25).

To understand the situation, one should consider that a mere lid was enough to guarantee the knight's relations' well-being "for many days". Clearly, bowls were a treasure by medieval standards. If such treasures were imported to West Siberia, it means that the local people were considered respectable partners rather than savages hiding in the backwoods and never seen by West European merchants. Also, in my opinion, the place where these unique works of art were found indicates that they were brought by sea, on a single West European ship. This is evidenced by the homogeneity of the goods and their excellent preservation. The land route, as it follows from Novgorodan chronicles describing the expeditions, entailed such dangers that this possibility should hardly be taken into account. The presence of a Byzantine bowl does not disprove the above because it most likely got to Siberia via Europe, and the same is true of several more Byzantine vessels found in the Lower Ob area.

The history of Byzantine toreutic art in the Kama area and West Siberia might provide a topic for a separate study. In the present context, though, suffice it to note that the Northern Sea Route functioned in the Middle Ages, connecting West Siberia with West European trade centers Visits of West European, specifically, English, sailors to northwestern Siberia were registered by 16th-century sources. Thus in 1584, merchants from Kholmogory told agent Antony Marsh, of the Moscow Company, that "...in olden times, your people reached the mouth of the River Ob by a ship that was wrecked, and its crew were killed by the Samoyeds, who thought that they had come to rob them" (Ocherki istorii Yugry, 2000: 99). This was evidently not the first contact between West European sailors and the Samoyeds, otherwise why should the latter have suspected the former of evil intentions?

Conclusions

It is evident, then, that the notion of "mute trade", used with reference to the trade between West Europe and northwestern Siberia in the early 2nd millennium, is misleading, in terms of either epoch or region. Developed contacts, well documented by the abundance of imported metal artifacts, demonstrate that the term is anachronistic and should not be used.

Among the directions of trade routes discussed above, the most documented ones are those from the Near East along the Great Volga Route via the markets of the Volga Bulgaria and the Upper Kama centers into West Siberia. By far less evidence are

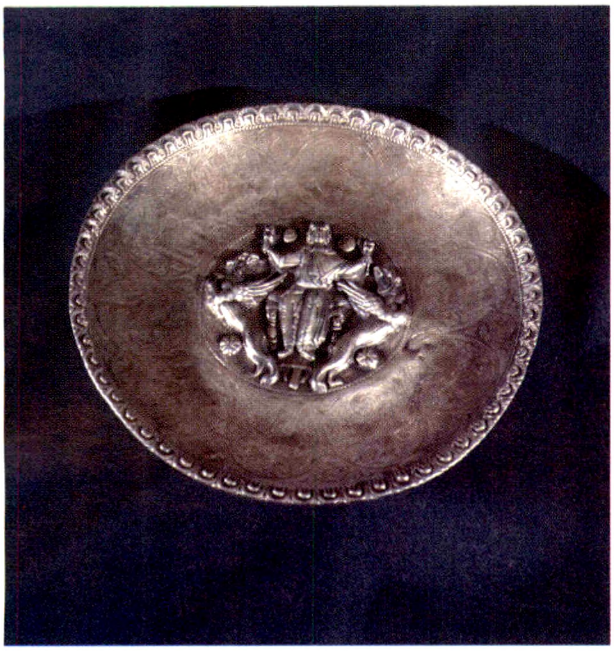

Fig. 2. Byzantine silver bowl with a representation of Alexander the Great's ascension. Photograph by Yu.A. Morozov.

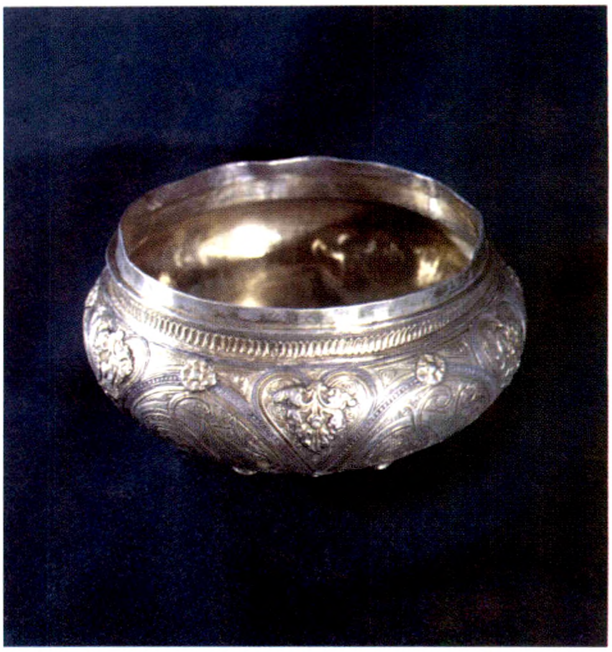

Fig. 3. West European bowl found in the Lower Ob basin. Photograph by Yu.A. Morozov.

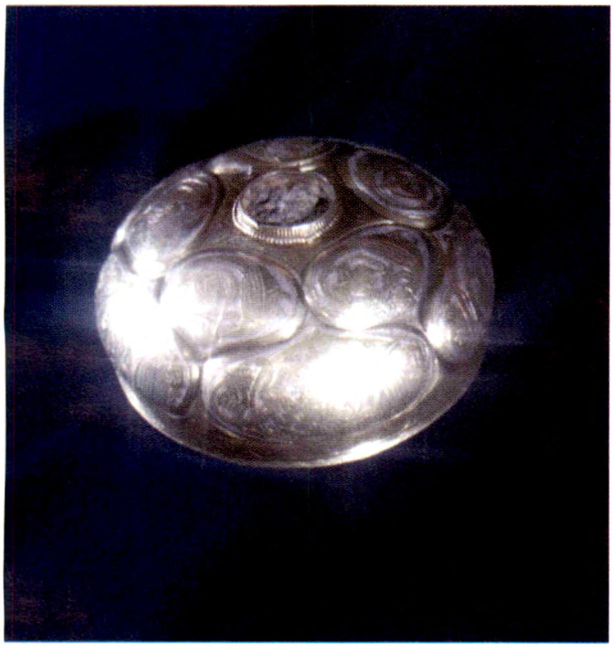

Fig. 4. Lid from a West European bowl found in the Lower Ob basin. Photograph by Yu.A. Morozov.

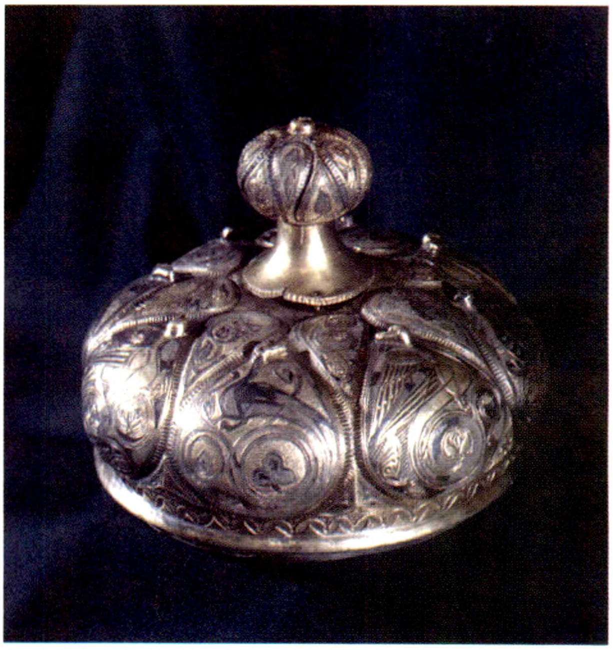

Fig. 5. Lid with an "apple" from the West European bowl found in the Lower Ob basin. Photograph by Yu.A. Morozov.

ties with Novgorod and Scandinavia. It has not yet been attempted to look for the remains of international trade fairs in northeastern Europe, nor northwestern Siberia. Connections between West Siberia and the world of medieval civilizations have been studied only in their static aspect, based on the number of imported artifacts and the geographical distribution of sites in the Lower and Middle Ob basin. Dynamic aspects of this process, namely, the ways in which the import functioned, remain to be analyzed. The study of routes by which West European silver vessels dating from the 12th – early 13th century may have arrived at northwestern Siberia, is the first step in this direction.

The profitability of northern trade engendered several phenomena. Both the Russian chronicles and the Old Icelandic sagas touch upon the conflict between "officials" making their way to fur treasures and private companies acting at their own risk: brothers Karli and Gunnstein, and Thorir the Dog; and Novgorodan troops led by Yadrey versus Savka with his men Attempts at monopolizing northern trade were made by the Bulgar rulers Ahmad ibn-Fadlan cites a story about an Indian merchant who planned to go to the north himself, but spent a long time trying to get permission from the Bulgarian ruler (Belavin, 2000: 31). Anecdotes about the "mute trade" and the horrors allegedly awaiting anyone traveling along the way north are commonplace in many texts by both Arab geographers and Russian annalists. The purpose of these stories may have been at least twofold Firstly, they were likely motivated by a praiseworthy desire to entertain and educate medieval readers. Secondly, the reason may have been more pragmatic: to scare away potential competitors who might intend trading with the northern peoples.

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THE URAL-SIBERIAN STYLE OF METAL PLASTIC ART OF THE VERKHNEOBSKAYA CULTURE

Introduction

The so-called Ural-Siberian artistic style, typical of medieval art of the Urals and West Siberia, was widely distributed in the forest and forest-steppe zones of these territories from ca AD 500 on. It is manifested in zoomorphous and anthropomorphous bronze artifacts of several Siberian cultures, including the Verkhneobskaya (Upper Ob) Culture of the forest-steppe zone, and is represented differently in various regions. In this article, we analyze features of the Ural-Siberian style of the Verkhneobskaya Culture in general, and in its local variants.

Ural-Siberian style in the Verkhneobskaya Culture

In the Ob area, the Ural-Siberian style is especially characteristic of finds representing broadly contemporaneous cultures of the taiga zone, such as Relkino (Chindina, 1977: 41 – 51, fig. 35), Potchevash, and Nizhneobsk (Orontursk stage) (Chernetsov, 1957: plates 29 – 31). This style was mainly distributed in the Ural and Cis-Ural regions, where it appeared in the Early Iron Age (Oborin, Chagin, 1988: 26). It was rooted in the ideology of forest people, whose main occupation was hunting. In AD 400 – 600, the style began to spread over the forest (taiga) cultures of West Siberia. In the Ob basin, it originated from the Kulai art of the Early Iron Age. Kulai people were foragers (Chindina, 1984· 72 – 76). In West Siberia, the Ural-Siberian style was strongly influenced by Kulai art (Konikov, 1987: 149).

The Verkhneobskaya Culture (AD 400 – 900) falls into four local variants. Tomsk, Novosibirsk, Kuznetsk, and Barnaul (Troitskaya, Novikov, 1998: 81 – 83). In this paper, we analyze the Ural-Siberian art as represented by archaeological materials of the Verkhneobskaya Culture. We do not consider artifacts from ritual places, which, in Siberian archaeology, are referred to as "hoards" because these could have been religious centers of vast territories extending beyond the boundaries of local variants of the Verkhneobskaya Culture.

The Ural-Siberian style was mainly spread among forest cultures. We will first address the Relka Culture, distributed in the Middle Ob basin and bordering the Verkhneobskaya Culture. One of its burial grounds, Relka, contained about sixty graves dating back to AD 400 – 800. Overall, 21 anthropomorphous and 24 zoomorphous figurines were found in the graves, in the earthen mounds, and elsewhere in the burial ground (Chindina, 1977· fig. 34, 35). The former group includes full-length figures and separate heads or masks with tattooed cheeks. The most common among the zoomorphous figurines are those representing a bear (complete animal or head), waterfowl, horse, and eagle owl with extended wings and a mask on the breast. Sable and lizard images are represented by isolated specimens. Certain figurines are compositions, such as an eagle pecking the head of an animal, a bird of prey aiming its beak at the head of an animal (possibly an elk), etc. In the Middle Ob area, there are several ritual sites containing medieval artifacts made in the Ural-Siberian style. The richest and the best known of these is the Vasyugan "hoard" (Chindina, 1991: 36 – 37). All the above indicates that the Ural-Siberian style was quite common for Relka art (Fig. 1, *1, 5, 7, 10, 11*).

The Tomsk variant (the northernmost among the variants of the Verkhneobskaya Culture) bordered the Relka Culture. Its area included the Lower Tom basin and the adjacent part of the Ob River basin. We will now focus on materials from four excavated burial grounds of

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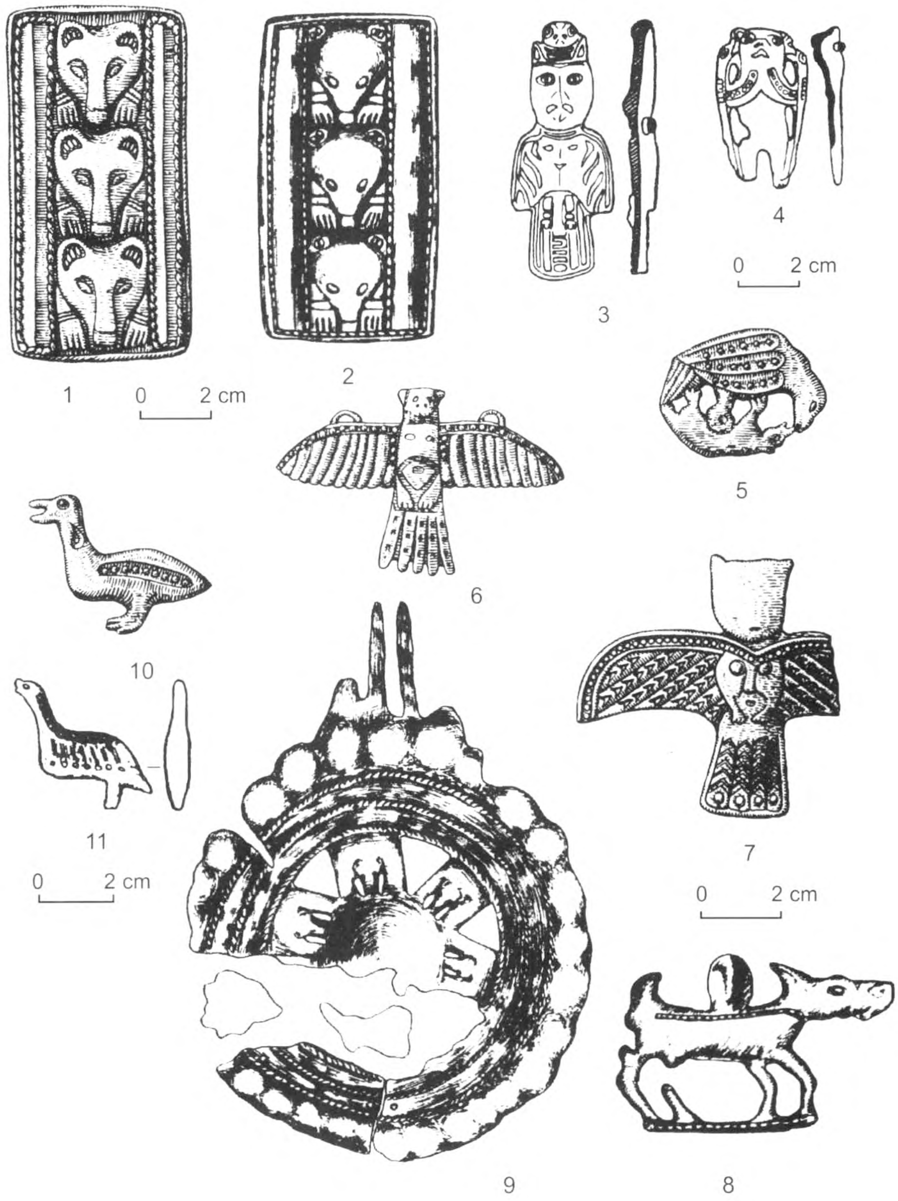

Fig. 1. Finds from the Middle (*1, 5, 7, 10, 11*) and Tomsk areas (*2 – 4, 6, 8, 9*) of the Ob River basin.

this culture: Timiryazevsk I and II, Arkhiyereyskaya Zaimka (Belikova, Pletneva, 1983), and Tomsk (Komarova, 1952: 50 – 57), all of them contemporaneous with Relka. Overall, they contain at least 103 graves dating back to AD 400 – 800. While the number of graves is much larger here than in the Middle Ob, they have yielded only 21 objects (plaques) made in the Ural-Siberian style. Six of these are anthropomorphous, and 15 are zoomorphous. The latter include those representing bear heads (six), birds with masks on the breasts (four), and one without a mask. Also, there are single figurines representing a horse, a standing bear, an elk, a hare, and a broken epaulet-shaped clasp with small images of heads and fore paws of five or six bears (Fig. 1, *4, 6, 8, 9*).

The Novosibirsk variant of the Verkhneobskaya Culture was distributed along the Ob River, from the mouth of the Uyen River to the origin of the modern Ob reservoir, near Kamen-na-Obi City. In thirteen burial grounds, at least 107 graves dating back to AD 400 – 800 were excavated. They contained 16 zoomorphous representations in the Ural-Siberian style (Troitskaya, Novikov, 1998: plates 18, 19). These include six plaques depicting heads of bears, a walking bear, a bird pecking a deer's head, two birds with masks on the breasts, two without masks, and three pipe-shaped beads depicting a squirrel and some fantastic animals (Fig. 2, *1 – 5*). The total number of artifacts is somewhat less than in the Tomsk variant, where

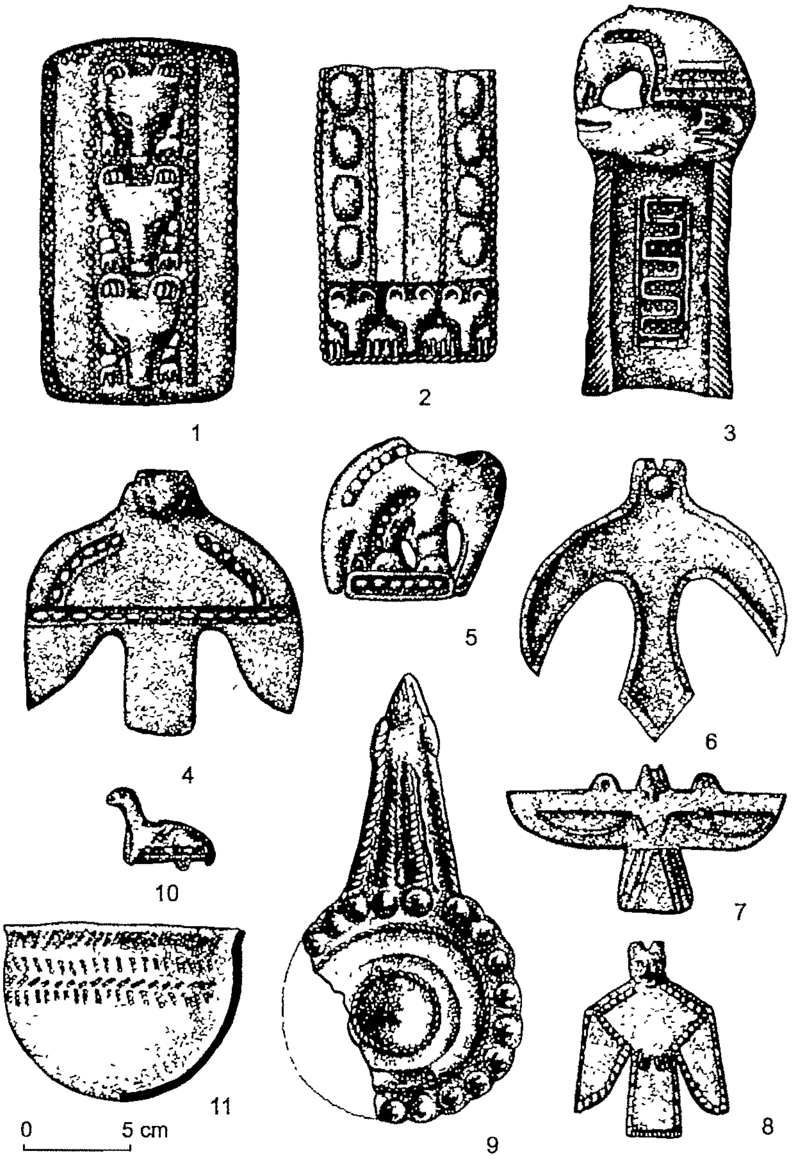

Fig 2. Finds representing the Novosibirsk (*1 – 5*), Kuznetsk (*6 – 8*), and Barnaul (*9 – 11*) variants of the Verkhneobskaya Culture.

103 burials yielded 21 images. In contrast, the Novosibirsk variant is represented by 107 burials with 16 figurines.

The Kuznetsk variant is distributed in the Kuznetsk Hollow, east of the Novosibirsk area of the Ob basin. Several burial grounds of the Verkhneobskaya Culture were excavated there. In two of these, at least 26 graves dating back to AD 400 – 800 were studied. They contained three plaques representing birds with spread wings (Ilyushin et al., 1992: fig. 23, *3*; Ilyushin, 1999: fig. 25, *32*, *33*) None of the birds has a mask on the breast (Fig. 2, *6 – 8*). Northeast of the Kuznetsk Hollow, on the northern slope of the Arga ridge, a famous ritual place is situated: Aidashinskaya Cave. Artifacts dating from various periods were found there The time span of AD 400 – 800 is represented by three plaques depicting heads of bears, a reindeer, three birds without masks, etc. (Molodin, Bobrov, Ravnushkin, 1980: plates 21, 22). This place might have been a ritual center of a territory that exceeded the Kuznetsk Hollow, and people of the Relka Culture might have transported their artifacts here along the Chulym River. Overall, the Kuznetsk variant, too, is characterized by artifacts manufactured in the Ural-Siberian style. However, they are less numerous here than in areas described above.

The Barnaul variant was distributed over a territory from the Ob reservoir to the junction of the Biya and the Katun rivers. Most sites are settlements. The few burials include those near Stepnoy Chumysh (Umansky, 1974: 136 – 139) and Blizhnie Yelbany, Barnaul (Gryaznov, 1956). In the latter locality, burial grounds BY XII and BY IV contained 15 graves dating back to the Odintsov Stage. None of these yielded any examples of the Ural-Siberian style. However, two objects from burial 32 at BY VII, which Gryaznov dated to the Fomin Stage, are closely paralleled by Verkhneobskaya materials (Ibid.: plate 42, *10*, *11*). We refer to a hollow figurine of a water bird and an epaulet-shaped clasp, one of its ends representing a stylized muzzle of an animal (Fig. 2, *9*, *10*). A similar figurine of a bird is a random find from Shipunovo (Shirin, 1999: 136, fig. 1, *40*). Hollow figurines of birds are quite similar to artifacts in the Ural-Siberian style (Chindina, 1977: fig. 35, *12 – 15*, Chernetsov, 1957: 203, fig. 29, *17*, *18*). The clasp from Barnaul (see Fig. 1, *9*) bears a close resemblance to a clasp (definitely early medieval) from Arkhireyskaya Zaimka. A vessel found in burial 32 at BY VII resembles those typical of the Odintsov Culture in terms of shape (Fig. 2, *11*) (Troitskaya, Novikov, 1998: fig. 27 – 31). All the above makes it possible to attribute this burial to the Odintsov, or possibly to the intermediate stage of the Verkhneobskaya Culture While scarcity of published materials from the Barnaul area of the Ob basin precludes any definite conclusions, it may be suggested that the Ural-Siberian style was characteristic of this variant as well

Conclusion

Artifacts made in the Ural-Siberian style are a typical feature of the Verkhneobskaya Culture. They are mostly associated with the Tomsk variant of this culture, which borders the Relka Culture of the taiga zone. They are somewhat less common in the Novosibirsk variant Features of this style progressively decrease in the following succession. Tomsk – Novosibirsk – Kuznetsk – Barnaul. Ural-Siberian stylistic peculiarities are present only at the early stages of the Verkhneobskaya Culture (5th – early 7th century), and disappear at its final stage (late 7th – 9th century)

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PARTICULARITIES OF THE STUDY OF ANCIENT WOODWORK

Introduction

In the course of excavations of archaeological sites, particularly settlements and burial mounds, researchers often find wooden objects (remains of dwellings, burial structures, weapons, household and ritual inventories), which contain unique information about historical events, the way of life and social relationships of extinct civilizations. During the comprehensive analysis of these primary sources, a logical necessity arises to correlate archaeological materials with ethnological and experimental data in order to systematize and classify the materials by various features, as well to explain historical processes proceeding in different cultural and historical formations.

Excavations of dwellings and burials normally yield much more secondary and indirect sources (dwelling foundation pits, burial pits, pole holes, ditches, trenches, deepenings, traces of decay, etc.) providing evidence of the past presence of wooden objects at these sites. During complex analysis, researchers give their own interpretations of non-material evidence of human activity, rightfully thinking that any reconstruction yields a path to truth. Based on these reconstructions, "directed by the *a priori* problems and researcher's interests," different typologies of one and the same material are identified (Klein, 1991: 103 – 106).

Archeologists who study the technology of ancient production have to deal primarily with those parts of the objects which were not subjected to the destructive impact of time and natural forces (Gryaznov, 1964: 73) It is very difficult and quite often practically impossible to restore the object for certain in its original shape, when only traces of rotting, decay and pole holes are left. Therefore, in reconstructions of any type, it is necessary to expose and disclose the whole set of features characterizing both the object and the process of its production. Revealing such features and knowing "what to look at, how to look, and how to extract the information" (Glushkov, 1996: 14), the technologist determines the role and place of the object in the context of human activity.

The study of traditions in woodworking in ancient times is primarily based on the study of an object's shape, characteristics of material structure, and traces left during the processing of the material using various tools. Without these data and results of use-wear analysis of the tool marks, the study of woodwork loses all its sense.

Ancient and modern woodwork differ strikingly. During ancient times, production of wooden articles was mainly a domestic craft. Ancient woodworkers had a minimum of simple tools at their disposal and only their high skill and their masterly use of the axe, adze, chisel and knife allowed them to reach a high quality of manufactured articles (Sokolsky, 1971: 173). Wide distribution of special instruments (saws, planes, lathes) and origination of workshops began at the BC/AD boundary. Only then the treatment of wooden materials had started to take on a modern look, which finally formed by the end of 19th century.

Not all researchers have a clear and complete idea of what woodwork was like in ancient times. Some researchers (practitioners) consider it as just a minimum of simple operations applied to processing

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of the wood surface; others (theoreticians) see it as a combination of operations directed at turning the raw material into the finished product; others regard it as a nearly modern factory production equipped with various machines and tools.

From the point of view of a technologist-archaeologist, the notion *ancient woodwork* implies techniques and technologies applied from the moment of raw materials procurement to the obtaining of finished products: working grounds (places for procurement and processing of wood), types and sets of instrument, stages and operations, modes and methods of the material's surface treatment, as well as manufacturing of isolated assemblies and parts of articles, methods of assembling complex constructions and structures, and a variety of forms of wooden objects and constructions.

The study of woodwork in ancient times is impeded by:

1) heterogeneity of the conditions of sources used, which is stipulated by differences in their structural and qualitative characteristics directly dependent on each other: preservation –treatment marks – applicability for study and reconstruction;

2) multiplicity of reconstructions of types of dwellings and burial constructions based on complex analysis of the secondary and indirect sources;

3) absence of a single system of universals (generally accepted notions and terms), which forces archaeologists to use self-coined names to designate assemblies and details, technological operations, and modes and methods of wood processing; this causes variant readings in the definition of one and the same type of object;

4) absence of a single system for complex analysis of sources.

Types of sources

In order to obtain objective and representative analytical results, an archaeologist-technologist has to choose sources of the highest degree of preservation with the maximal amount of treatment marks. These two characteristics are interdependent and determine the level of applicability of the source for its complex analysis and interpretation (Garden, 1983: 49, 194; Kuzmin, Varlamov, 1988: 146; Kvirkeliya, 1988: 30; Pogrebova, Raevski, 1992: 4). Ideally, the above-mentioned formula "preservation – treatment marks – applicability for reconstruction" should form a base for the study of ancient woodworking.

All these taken together create a real perspective for the transition to conclusive interpretation of the status of not hypotheses, but theories which can be verified through the methods of exact sciences (Larichev, 1988: 184).

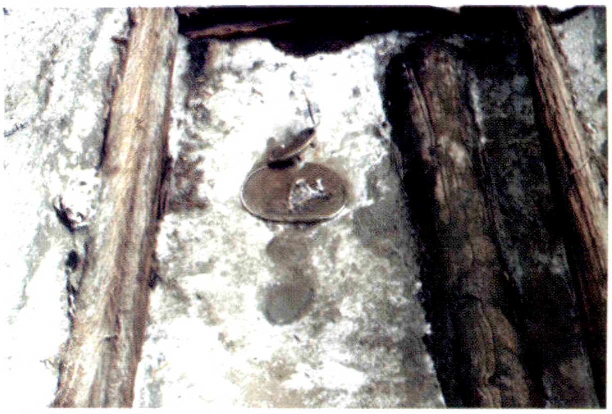

Fig. 1. Wooden articles in a "frozen" grave. Ukok Plateau, the Altai.

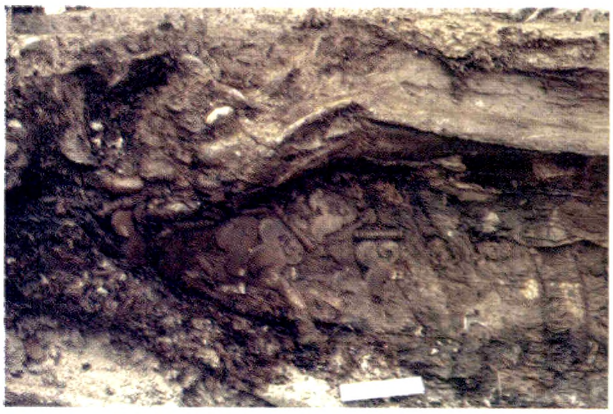

Fig. 2. Carved adornments of horse's bridle in a "frozen" grave. Ukok Plateau, the Altai.

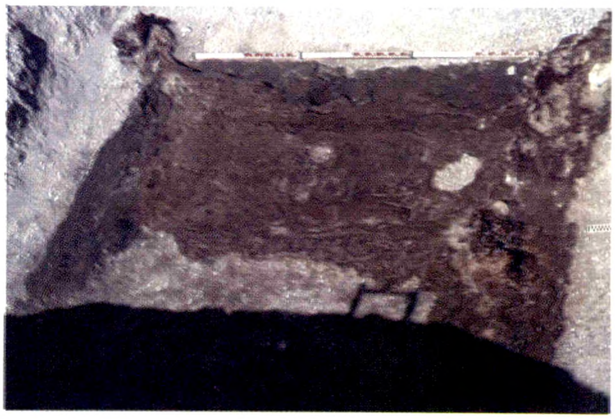

Fig. 3. Pressed wooden chamber with traces of wood degradation. Ukok Plateau, the Altai.

The sources used for the study of woodworking traditions have been subdivided into primary (complete, living), secondary (residual), and indirect, in terms of applicability for analysis.

Primary sources are representative; they include varieties of fairly well-preserved wooden objects, the surfaces of which display a maximum of information about the technology of the wood processing and techniques of manufacturing as distinct evidence features (Fig. 1, 2).

Secondary sources include complete parts, remnants and fragments of wooden constructions and objects without visible marks – diagnostic features of woodwork. They do, however, allow reconstructing the principles of manufacturing and mounting of the constructions' assemblies and parts. These are samples of burnt and degraded wood (pressed (Fig. 3), half-rotted, decayed), foundation pits, burial pits and holes (differing in diameter and inclination angle) left by poles and containing wood remains.

Indirect sources consist of kits of instruments used in woodwork, as well as isolated tools found in caches (ritual burials) or collected from the surface in the region under study. They also reveal the bulk of geographical information presented in publications, field reports, photos, graphics, and video materials.

Of course, this division is rather conventional, since, depending on the situation, secondary and indirect sources well may be primary and unique for the characterization of an archaeological site. However, such differentiation of the sources is necessary for complex research of techniques and technologies of ancient woodwork

The study of the peculiarities of woodwork in ancient times requires two interrelated stages of research – field and laboratory studies. The bulk of primary information about traditions, techniques and technologies of wood processing is normally obtained from the site's excavation, through study of "living" material.

As investigations have demonstrated, the major portion of primary information comes from settlements and burial complexes, each of them having its own specifics in terms of research.

Complete constructions of ancient dwellings have not been found yet anywhere At best, floors and, very rarely, fragments of first rows of logs crowning walls as well as upper covers (roofs) can be found (peat bogs of Europe and the Urals). These remains of mostly low one-level dwellings are situated on one horizontal plane. Normally they can be easily cleaned and do not cause a lot of difficulties while being examined

Inner burial constructions of frame-pole and framework types present particular difficulty during the study of archaeological objects. In accordance with archaeological excavation regularities, the research of the site goes step-by-step and stage-by-stage downwards: counter floor, framework of the shed, overhead cover, and framework.

Due to the poor state of these materials' preservation, it is often impossible to clean the burial structure within the grave pit – normally pits are very narrow and, in order to widen the pit, there is a risk of destroying one of the most important sources of information.

Usually, it is only possible to study the internal parts of the framework. In the field, research is often complicated by wood degradation and destruction (rott, decay, burned wood) (Kudryavtseva, Litvintseva, Sokolova, 1994: 54) and also by specifics of archaeological wood· taken out of its usual environment, it immediately becomes dry and cracks. Right before the eyes of a researcher, practically all the traces of treatment may be destroyed and after a short period of time it becomes impossible to reveal principles of the construction's assembly (Gryaznov, 1980: 8). Therefore, it is not by accident that during the reconstruction of dwelling forms and burial structures and also during the singling out of specific traditions of wood processing, unintentional distortion of the information may happen. Taking this into consideration, it is very important to record these archaeological sources right in the field, quickly and precisely by means of photo and video cameras.

Additional information can be obtained through laboratory studies, conservation and restoration, documentation of museum collections, special photo and video shooting as well as by usage of the photo-analytical method and dendrochronological analysis, relative and absolute dating techniques, and correlation of dendrochronological and radiocarbon determinants.

Characteristics of the sources

Carpentry has been practiced for many thousands of years. Building practices have been constantly improved, refined and perfected by masters. Analysis of archaeological data demonstrates that a variety of woodworking traditions were embodied in the manufacture of such mass wooden constructions as dwellings and "mortuary houses."

Material, architectural, constructional and technological features of dwellings and burial structures have a lot in common. It is probably not by accident that ancient builders aimed at giving "mortuary houses" the appearance of dwelling constructions.

All archaeological reconstructions have been primarily based on ethnographic data on house-building traditions. That is why in scientific literature there are a lot of appellations used to designate types of ancient wooden dwellings and burial structures, as well as classifications of wooden burial beds. Appellations employed for definitions of techniques utilized during the erection of wooden constructions are also numerous. Such a situation can be explained by the differences in professional traditions of the researchers, which quite often lead not only to the wrong usage of some terms, but also to wrong conclusions. Wrong and inaccurate interpretations often travel from one publication to another, therefore becoming quite common (Medvedev, Nesmeyanov, 1988: 113)

The study of many archeological and ethnographical sources has shown that all timbered buildings (dwellings, household premises, burial structures) are based on two main architectural elements. a bearing vertical – *support* (pole, post) and a borne horizontal – *overhead cover* (beam, log, matrix). A clear division of the elements of architectural structure into supporting and supported has been recorded already on the simple megalithic structures of the Stone Age – menhirs, dolmens, and chromleches (Gutnov, 1985: 20 – 21).

Later on, as civilization and ancient manufacturing progressed, the development of the post-beam system of architectural constructions proceeded in the ancient states of Mesopotamia, Egypt, Greece, Rome, Persia, India, China, and Japan. In each case, it varied depending on cultural and historical traditions of social formations and specifics of local building materials However, in spite of variations in construction forms, the principle of expedient combination of the vertical supports and horizontal beams remained unchanged both in stone and wooden architecture and has safely "survived" to the present Vitruvius, a famous Roman architect, explained the origin of the strict order of interposition of a stone structure's parts by the imitation of wood structures. He determined, that the ancient forms of order are universal in relation to materials, and eventually they reproduce the work of the post-beam construction rooted in wooden architecture

It was not without reason that ancient builders very often made axe notches on stone columns and used the same joints as on the wooden supporting posts (Ibid.· 28). In such post-beam construction, the most important joint was situated in the corner, where the beam was connected with support.

The durability and solidness of the whole construction depends on firmness and stability of the connection between the end of the beam and the upper plane of the support. The same technological canons and principles are realized in the horizontal beam (log) structure.

The vertical-horizontal system is the base (framework) of any building structure. However, archeological and ethnographical data demonstrate that wooden structures are not always represented by post-beam structures composed of vertical supporting posts and horizontal beam-logs. More often just horizontal constructions of walls made of logs, squared beams and blocks present the classical example of beam (log house) structure Only vertical constructions made of logs and posts are seldom encountered. Combined building structures with framework of horizontal logs and additions of post-beam construction have also been found.

Classification of ancient wooden buildings is so far in its early stage. The main complication pertaining to the systematization of such archaeological and ethnographical monuments is the difficulty in selection of the main classification principle (Zasurtsev, 1959: 277 – 289; Gratsianskaya, Listova, Tokarev, 1968: 8 – 9).

When analyzing early Scythian burial structures as they were described by Herodotus and presented by archaeological data, Olkhovski suggested a simple classification of the steppe and forest-steppe tombs (Olkhovski, 1978: 83 – 97; Melyukova, 1989a: 55). This classification, in our opinion, is the most applicable to characterization of regional specifics of burial constructions. Unfortunately, it does not take into consideration the general technological principle of manufacturing all the wooden structures, but rather it reflects the outer morphological features of objects.

In the research practice there exist several approaches to the classification of wooden constructions.

1. *Ethnographical approach* is based on materials of complex study of various types and features of construction of real buildings All the traits determining the type of a building (like architecture, vertical and horizontal planning of the building, levels, partitions, particulars of the interior, décor details, presence of stoves, and others) have been revealed in the course of ethnological examination of hundred-percent complete objects, manufactured completely of wood or of several materials (wood, stone, reed, clay, etc.). Types of buildings are determined when all of the above-mentioned factors are taken into consideration. Out of this comes the variety of types identified by one of the mentioned traits or by a combination of the latter.

2. *Archaeological approach* is based on the analysis of scanty remains of buildings or indirect evidence of their existence as well as the interpretation of these sources based on the reconstruction of the supposed outer appearance of

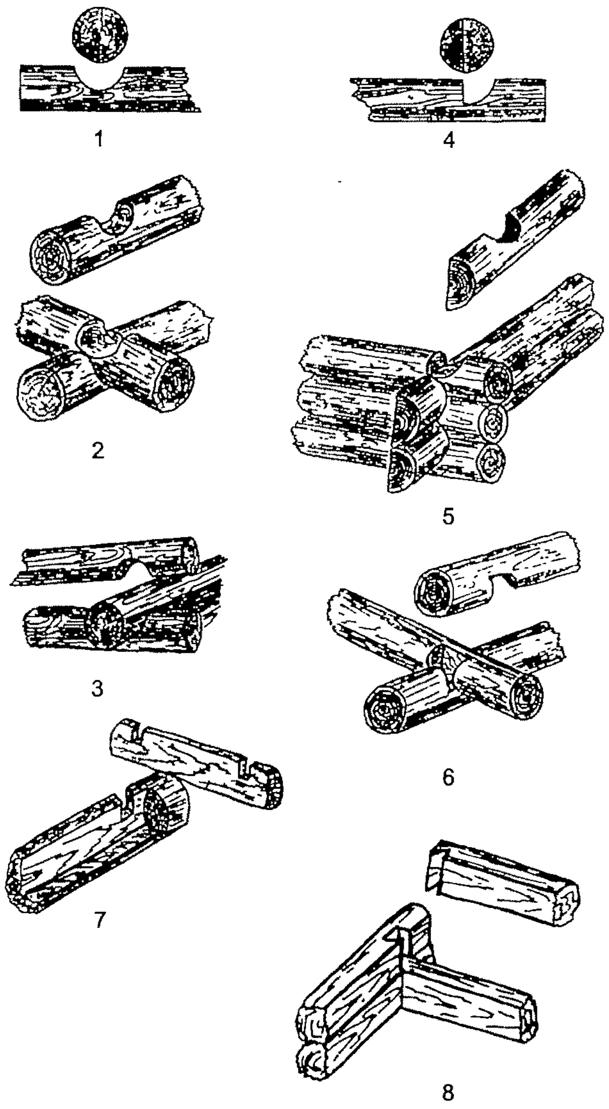

Fig. 4 Corner joints with a bilateral remnant (*1, 2* – "*v oblo*", *3* – "*v okhlup*", *4, 5* – "*v kryuk*", *6* – combined "*v kryuk*" and "*v oblo*") and early Iron Age joints (*7* – "*v oblo*", *8* – "*v roub*")

a building, and finally on the subsequent singling out of hypothetical types.

3. *Technological approach* is based on results of examination of the internal structure of the building (particulars of the wall construction), combination of the vertical supports and horizontal beams and joints (corner conjunctions) as well as revealing the main component (feature) of the building and singling out types proceeding from the correspondence of the structure particulars (construction) to the architecture (outer appearance).

Each of these approaches has advantages and disadvantages. The best, from our point of view, is the complex approach. In our research, it would be reasonable to suggest the utilization of the whole complex of traits and to base the classification on one of the most significant traits – technological – using all other traits as complementary.

The main component of any wooden construction (dwelling, household building, burial, fort, prison) is a wall.

In our opinion, technology of wall manufacturing and particularly the joining of angles (corner joints) determines the type of the building structure while the roof, overhead cover, floors and counter floors, dependent on the quantity of walls, their dimensions and construction particulars, are complementary features. Therefore, we put the technological features of wall construction at the basis of our classification.

Corner joints. Technological analysis of burial structures shows that all types of corner joints can be united into tree main types: rigid, flexible, and combined.

Rigid corner joints are primarily encountered in log structures. The following types can be singled out among them: (1) with a unilateral remnant (ends of the logs coming out of the structure from one of its sides – longitudinal or transversal), (2) with a bilateral remnant (ends of the logs coming out of the structure from all its sides); and (3) without a remnant (ends of the logs do not extend beyond the limits of the structure).

Technologically, the following types of rigid corner joints can be singled out:

With a unilateral remnant: "*v potai*"* and "*vrub*" (trapeziform). Figured, widening tenon on the butt-end of one of the logs is placed in the socket of the same configuration, and cut out by an axe or a chisel on the inner surface of another log (Fig. 4, *8*). This rare type of corner joint has been recorded at the Hunnu burial in the Noui Ula burial ground in Mongolia.

With a bilateral remnant: "*v oblo*" ("*v ugol,*" "*v chashu*"), "*v kryuk,*" "*v okhlup*" (Fig. 4, *1, 2, 3, 4, 5*), "*v okhryapku*" (Fig. 5, *6*), "*v rezh*" (Fig. 5, *4*). Pares of longitudinal and transversal logs are tightly put into semispherical or rectangular grooves cut at some distance from the ends of logs.

Without a remnant: "*v lapu*" (Fig. 5, *1, 2, 3*). Pairs of longitudinal and transversal logs are tightly fixed by rectangular or trapizoid tenons cut on the ends of logs.

Flexible corner joints are called "*v styk,*" "*v torez,*" "*vnakhlest*" (with or without remnant), "*v*

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* Here and below in double quotes are given terms traditionally used by Russian carpenters

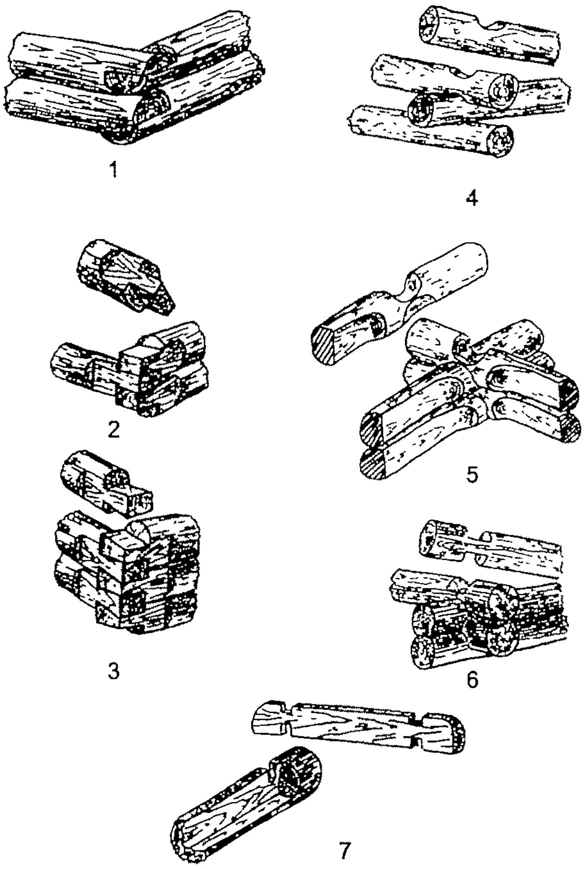

Fig 5. Corner joints without a remnant "*v lapu*" (*1* – simple, *2* – "*sarainaya*", *3* – "*swallowtail*"), with a remnant (*4* – "*v rezh*", *5* – "*v oblo*", *6* – "*v okhryapku*"), and an early Iron Age joint (*7* – "*v okhryapku*").

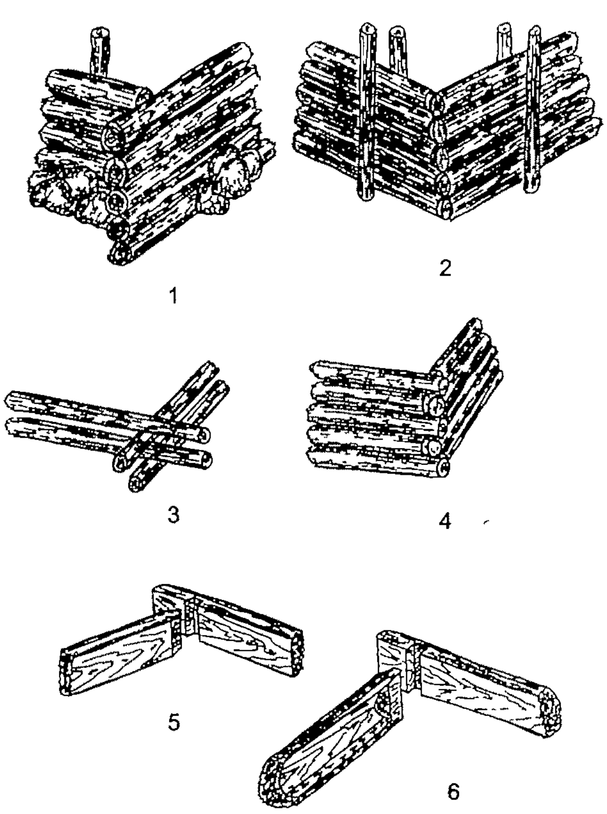

Fig 6. Flexible corner joints (*1* – "*v styk*", *2* – "*v torez*", *3* – "*v nakhlest*", *4* – "*v nakladku*", *5*, *6* – mortise and tenon)

nakladku" (Fig. 6, *1*, *2*, *3*, *4*), mortise and tenon ("*v ship*," "*v paz*" (see Fig. 4, *8*; 6, *5*, *6*; 7, *3*). Constructions with joints of this kind are characterized by the following features:

1. Walls of the frame or frame-pole constructions, put together from logs stacked horizontally one on top of another, as if they are placed butt-end to butt-end with or without a remnant ("shrines" of Besshatyr) (see Fig. 6, *1*, *2*).

2 Walls of framework structures are put together by means of alternating placement of logs with a clear space in one row of logs – disperse laying (Chilikta, kurgan 5; sepulchres of Salbyk, Tepsey, Uiybat) (see Fig. 6, *3*). Sometimes in order to avoid sagging, logs of the structures are additionally fastened by set-in blocks (Tashtyk sepulchre) or by ropes and belts through pairs of through holes (Besshatyr, Arzhan).

3. Walls of the structures are assembled by rows of logs put together tightly. As a result, their ends overlap the joining spots by their butt-ends (frame construction Issyk) (see Fig. 6, *4*).

Ancient carpenters used two other types of log binding. The pole type (vertical-horizontal) technique implied digging thick vertical pole-supports around the corners of the buildings. These vertical pole-supports had elongated grooves, into which the logs were put in horizontally and tightly by their butt-ends and were squared in accordance with the grooves' profile. These are the so-called pole structures (see Fig. 7, *3*). When using mortise and tenon (horizontal) technique, the butt-ends of the short transverse logs and semi-logs squared in accordance with rectangular and triangular tenons were put in mortise-grooves of similar configurations, cut at a certain distance from certain elongated grooves (rectangular or conical) (see Fig. 6, *5*, *6*).

Combined joints unite two types of corner coupling (mortise and tenon and slot). "*v pogon*" (on

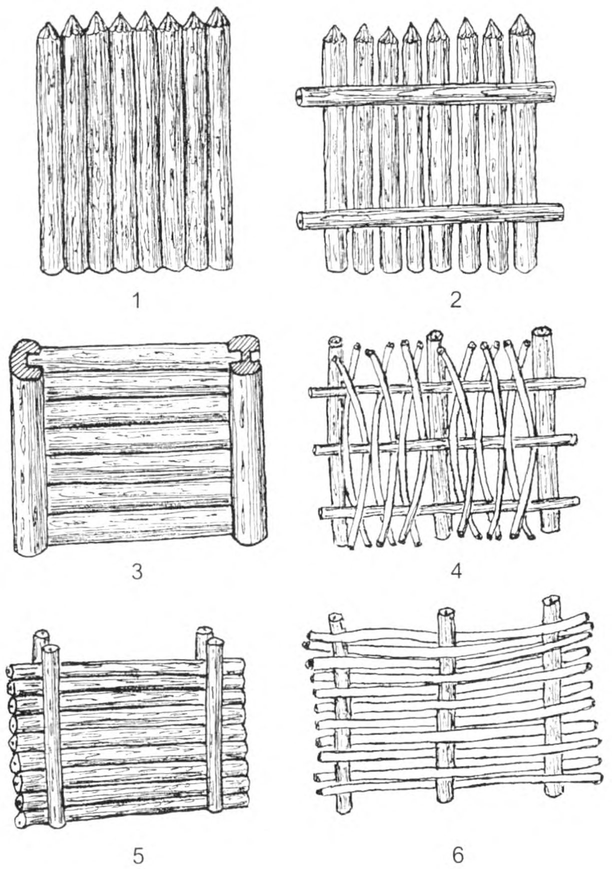

Fig. 7. Techniques of wooden wall consruction (*1* – "*chastokol*", *2* – "*zaplot*", *3* – "*zaklad*", *4* – "*tyn*", *5* – "*pryaslo*", *6* – "*pleten*").

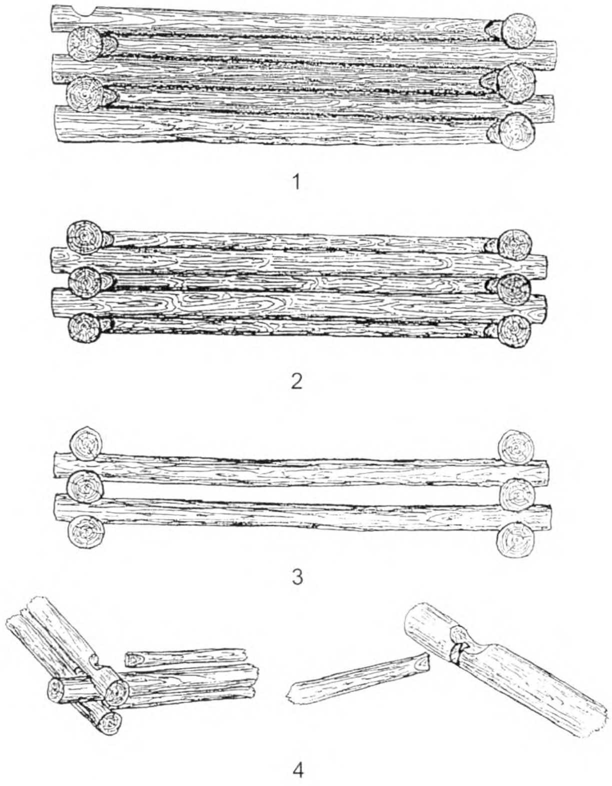

Fig. 8. Combined corner joints (*1* – "*v pogon*", *2, 4* – "*v iglu*", *5* – "*v rezh*").

both butt-ends of a pair of logs at the row of logs only tenons are made; another pair has cups and rectangular grooves) (Fig. 8, *1*); *"v iglu"* (every log in the row of logs from one of the sides has a rectangular pin at the butt-end; from the other end at a certain distance from the end, a rectangular groove is cupped at the top) (Fig. 8, *2*, *4*).

As ethnographic research shows, every ethnicity brings to its region traditional construction skills from various places. The selection of rational forms happens with time; they must correspond in the best way to the local conditions and further improvement depends on the ecological situation (Lipinskaya, 1995: 174 – 207).

Historians studying Russian architecture have found that in the past most often the corner binding was done by the technique employing bilateral remnants of logs ("*v oblo*", "*v ugol*", "*v chashu*"); it allowed better preservation of heat in the house. Much more rarely, labor-consuming and non-practical binding of the logs without remnants was used (Chizhikova, 1987: 224).

During construction of non-heated household buildings (barns and sheds of different kinds) normally made of uneven tree trunks, mortise and tenon junction (the so-called pole technique) was used as well as "*v pogon,*" "*v iglu,*" "*v rezh*" (Okladnikov, Gogolev, Aschepkov, 1977: 119; Ganzkaya, 1967: 173; Zasurtsev, 1959: 264).

According to many researchers, the architecture of wooden burial structures made out of wood demonstrates people's desire to give them the appearance of a living dwelling. It was found that traditions of house construction laid in the canons of the manufacture of burial structures (Gryaznov, 1950: 59; Rudenko, 1960: 215; Semenov, 1956: 215; Akishev, Kushaev, 1963: 77; Grach, 1980: 32; Itina, 1992: 33; Kubarev, 1991: 27 – 28; 1992: 15; Polosmak, 1994: 22; Olkhovski, 1978: 86). This means that classification of wooden burial structures had to be done in accordance with the principle of elementary building structures.

Our research shows that all known wooden buildings can be subdivided by manufacturing technology into log, frame, and pole structures and their combinations (frame-pole, log-pole, and log-frame); by shape into rectangular, square, polygonal, multi-angle ones, in the shape of a truncated pyramid; by terms of spatial location (in relation to the environment) into surface, semi-underground (surface-underground), and underground structures.

Log structures. There are several kinds of log structures, but according to technical and technological criteria only classical structures can be considered as typical.

Walls of a classical log structure are assembled by the method of continuous tight laying without gaps of the transversal and longitudinal pairs of logs into rows of logs, whose ends are connected by "joint with remnant" and "joint without remnant" techniques. In the corners of log houses, the ends of the logs are tightly tied together with the use of special rectangular and semi-spherical figure brackets (locks), giving the structure more solidity.

Up to the late Middle Ages, ancient skilled workers did not know dowels – wooden or metal – by means of which rows of logs are connected tightly at the corners and in the middle. Therefore, in order to make the structure more solid and to avoid the horizontal shift of the logs, they used a system of complicated combinations of grooves (cuts, grooves, locks), which are no different from the modern ones.

At archaeological sites of Europe, corner joints of two kinds have been recorded: at Bronze Age monuments of Germany, "*v oblo*" (Clark, 1953: plate XIV, *b*) and at early Iron Age sites in Poland, mortise and tenon joint (pole type) (Ibid., 1953: 165, fig. 88; Malinov, Malina, 1988: 14 – 15).

The variety of techniques of corner joining of logs in log constructions is vividly illustrated by complete burial structures of the early Iron Age from "frozen" graves in the Altai. In the Pazyryk Culture alone, over 20 varieties have been found (Semenov, 1956: 216; Mylnikov, 1999: 24, 94, 95, fig. 41, 42).

Frame structures were built in the simplest way. Their walls were usually put together in accordance with the method of consequent horizontal laying of pairs of logs, by imbrication technique with a remnant, thus leaving a log-wide gap between them Wooden frame structures were most often used during the construction of burials. Such large structures are called sepulchers (Bolshoi Salbyk, Tepsei-3, Chilikta-5).

Log-frame constructions demonstrate another method of assembly of the burial structures' walls. their walls are put together out of tightly placed logs in such a way that butt-ends of the logs of one of the walls are resting against the surface (junction) or against the logs of the neighboring wall. To make structure more rigid, the walls of such structures are strengthened with logs put on the sides, piles of stones, or tightly packed ground (burial in the Issyk kurgan).

Log houses with mortise and tenon joint in corners present the third type of mounting of the frame structures with the use of rectangular and pointed tenons and mortises to connect logs in the upper part of the wall (Verkh-Kaldzhin-2, kurgan 2; Kara-Koba; Kyzyl-Dzhar; Ovgont Uul, bulsh 1; Berel-11) (Molodin, Mylnikov, 1999: 446 – 453; Mogilnikov, 1983: 3 – 40; Samashev, Faizov, Bazarbaeva, 2001: 12 – 14). These wooden structures can be seen as an imitation of similar structures made of stone blocks from the Late Bronze Age epoch in the Altai (excavations of U.F. Kiriushina) and the Crimea (Ilinskaya, Terenozhkin, 1986. 172).

The flexible position of the mortise in the socket loosened the corner joint, making the whole construction staggered. For additional rigidity, the longitudinal rows of logs were surrounded by three or four additional logs and supported with piles of stones or tightly packed ground

The category of frame structures includes different types of "frames" without rigid corner junctions, as well as simple covers for burial pits made of longitudinal and transverse layers of logs resting on ground or wood laid along the perimeter of the pit.

Pole structures are made of logs (poles), vertically placed along the perimeter of the protective walls surrounding fortified settlements, foundation pits of buildings, and burial pits In pure form they can be found in the form of palisades (Zasurtsev, 1959: 297) or palings (Kuznetsova, 1997: 64) surrounding forts and fortified settlements as well as panels covering lateral niches of burials (see Fig. 7, *1, 2*). Most often they are elements of complementary components of supporting poles and pole-joints in frame-pole, log-pole and composite structures.

Log-frame structures combine horizontal buildings of these two types. Kurgan Arzhan can be used as a classical example. This is a round flattened burial structure with a double felling (outer is cut "*v oblo*" and inner "*v lapu*"), surrounded by concentric radial rows of chambers.

Frame-pole structures are most numerous and variable in terms of manufacturing technologies of wooden structures. They combine vertical (carrying) supports and horizontal (carried) base beams. Walls of these structures can be built in several ways.

1. Log house – "*zaklad.*" This is a "*zaplot*"(pole structure), the base of which is made out of strong vertical poles with one or two deep elongated

guttered mortises Trimmed logs with rectangular tenons at the ends are put in these mortises (Fig. 7, *3*).

2. Log house – "*pleten.*" Structures of this type are made by means of vertical (pole) and horizontal plaiting of the walls around the base – vertical posts with three or four thick poles horizontally attached to supporting poles. Plaited walls of these buildings are usually coated with clay (Ganzkaya, 1967: 174 – 175) (Fig. 7, *6*).

3. Log house – "*pryaslo*". Walls of these structures are made of trimmed logs, put one on top of the other in a spaced out manner on the lining or interchangeably (top to the base) and squeezed between several pairs of vertical poles (Fig. 7, *5*). Sometimes on the tops of these poles two or three pairs of holes were made, through which ropes and belts were put and these belts and ropes tied the poles together. The walls of such structures were attached to each other "*v torez*", but not connected in the corners "Royal" tombs of the Besshatyr burial ground present a classic example of this type of construction (kurgans Bolshoi, 1, 6, 8).

Frame-pole structures include a variety of chambers and sepulchers with palings, palisades, and sheds with layers of logs, and also grave covers supported by beams laid on vertical support poles. Log constructions in the "Royal" kurgans of the Pazyryk, Tuekta, and Bashadar, various types of fences, and the vertical and horizontal linings of burial pits represent structures of this kind.

Log-pole structures are represented by tombs with inclined (vertical) poles, logs and palings (Martynov, 1979· 24) In other words, this is a classic log construction occurring in the middle of a burial pit and surrounded by one or several rows of vertical or inclined poles or beams.

When an additional frame-pole construction is made over the log-pole one (shed), then such a sophisticated burial may be attributed to the log-frame-pole or combined constructions exemplified by Pazyryk, Tuekta, Bashadar, and Shestakovo-6 burial complexes.

In spite of the fact that, in terms of manufacturing principles, dwellings and burial structures are similar in many ways, there are some differences between them, stipulated by functional features as well as by cultural, historical and ritual traditions of societies.

Burial boxes. As results of technical and typological analysis have demonstrated, burial boxes can be divided into two types: closed (hermetical constructions with a cavity, a lid or a cover) and open (flat without a lid or cover). Not rejecting generally accepted definitions of the burial box types, we suggest the following classification:

Boxes of closed type are represented by holed blocks (Fig. 9), coffin-sarcophagi, sarcophagi, and coffins made of a solid piece of wood, as well as boards, coffin-boxes, coffin-cradles, etc.;

Boxes of open type are represented by planks, beds made of boards, beds (Fig. 10, *11*), plank-beds, platforms (Fig. 12), latticed coffins, barrows, catafalques, cradles, etc.

Reconstructions

Reconstruction, in the comprehensive meaning of the word, is the natural process of studying historical reality through restoration of the original appearance of preserved remains (Rekonstruktsia, 1975: 615). Every reconstruction includes the synthesis of two components: objective (information coming from the source) and subjective (experience, knowledge, intuition, and imagination of the researcher). Therefore, any reconstruction, except for the standard one, is only one possible version of what could have been (Glushkov, Sakhozhaya, 1992: 127 – 129).

The balance and correlation of hypothesis and statement, knowledge and opinion, reality and delusion have always a central issue in archaeology, just as in any other science (Kvirkeliya, 1988: 18 – 32; Shapova, 1994: 6 –15). Objective truth is a reinstatement of the object in such a way that it exists by itself, independent of the researcher and his consciousness. Truth is the result of research checked many times in practice, coming ever closer to the ideal (Spirkin, 1983: 226 – 227).

In the study of the technological problems of wood treatment in ancient times, truth (adequate result) is first of all derived from the analysis of original sources ('living' sources – absolutely complete objects, dwelling structures, burial structures), due to the unique opportunity of studying original sources on the ethnographic level. The results of this research are correct, representative, and visual, and they can be easily verified and therefore have full rights for wide use in various reconstructions.

Depending on natural and climatic conditions of the region, chemical composition of the soil, the depth at which objects are situated, humidity, and natural substances such as ice, damp clay, silt deposits, and peat bogs, archaeological objects (dwellings and burial structures) come to archaeologists in various states of preservation (Vikhrov, 1959: 132 – 135; Plenderlis, 1968. 30 – 54).

Most often these are holes of various forms and configurations, pole holes and ditches without wood remains. Sometimes in pole holes and ditches,

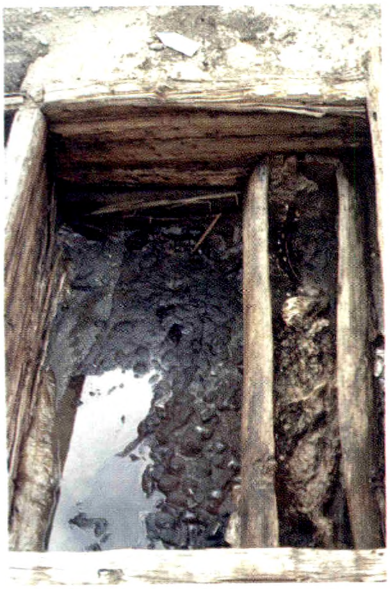

Fig. 9. Wooden chamber with a coffin. Ukok Plateau, the Altai.

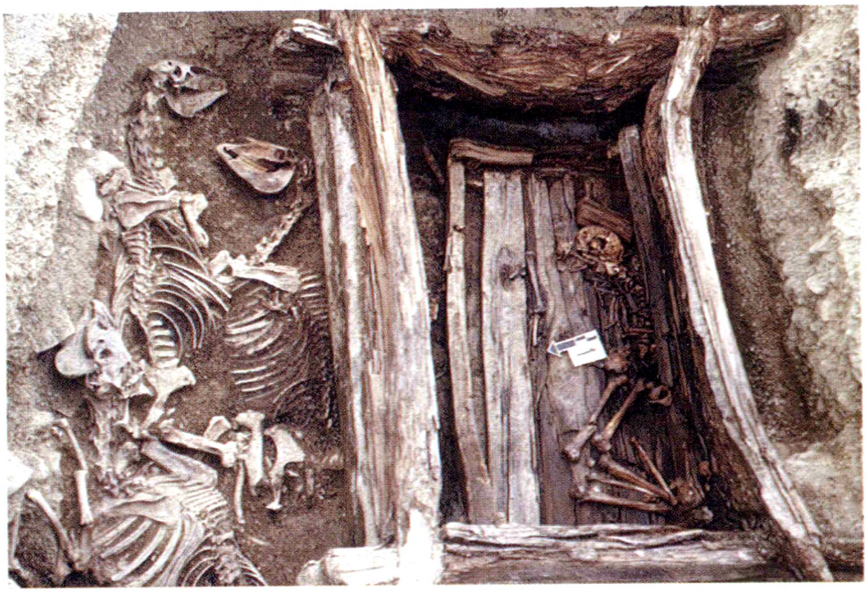

Fig. 10. Wooden chamber with a burial bed. Yustyd, the Altai.

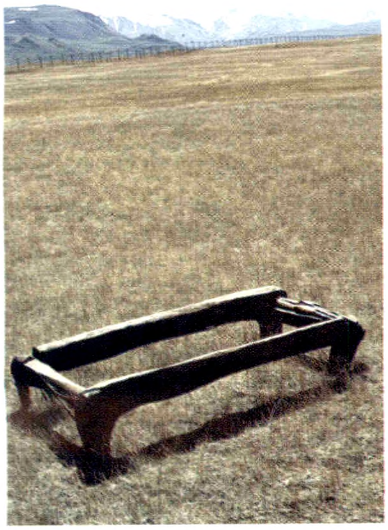

Fig. 11. Burial bed. Yustyd, the Altai.

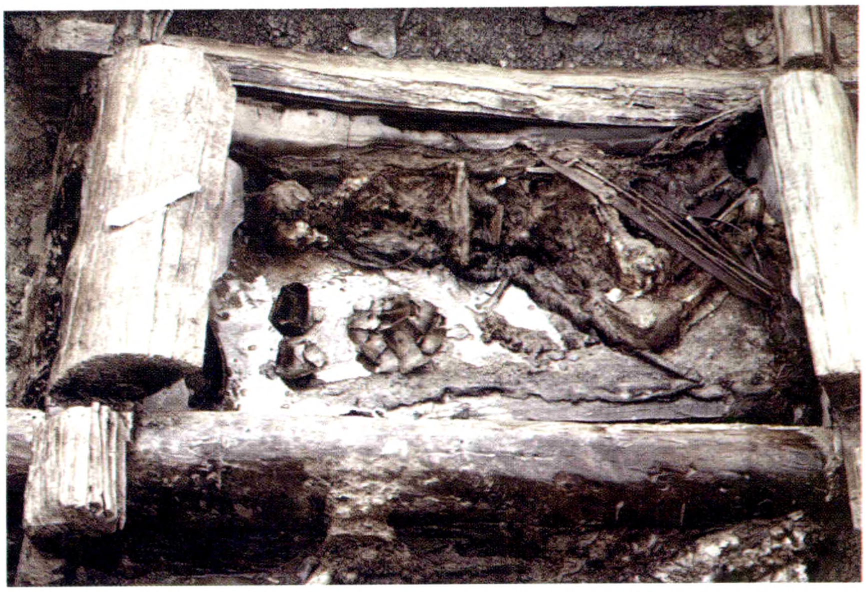

Fig. 12. Wooden chamber with a bed-platform made of half-beams. Ukok Plateau, the Altai.

remnants of burned and rotten wood, fragments of the lower rows of logs of the structures, floor planking, ruined overhead covers of ceilings and roofs, parts of semi-decayed and burned structures, and decayed parts are found. Practically complete structures, almost always damaged by pillagers, can be found very seldomly.

The study of material normally proceeds in accordance with the following scheme: use-wear, comparative-historical and comparative-typological analysis – mental experiment (theoretical modeling) – physical experiment (manufacturing of replicas) – methods of ethnographical analogy, graphical modeling (Glushkov, Borodovski, 1988: 27 – 29) – technological, use-wear, planigraphic experiments (Volokov, 2000: 30 – 35) – cultural-historical interpretation of the material.

Final reconstruction might be one of several variants:

1. In the complete absence of evidence of woodworking, the shape and dimensions of the hollows, and the order of the pole holes and ditches along the perimeter and in the center of the object (configuration, depth, angle of inclination, distance

from each other, etc.) are examined. The outer appearance of an object, structure of the walls, roof, ceiling and floor planking overhead covers are recreated hypothetically (speculatively). For a technologist, this reconstruction contains minimal information about wood processing techniques and technology. It can be called conditional.

2. The order of distribution of the rotted and burnt remains of the construction with fragmentary preserved features, stratigraphic position of the decayed wooden layers. With the exception of certain details, the outer shape of the structure, roof, type of ceiling cover, wall structure, types of the conjugate angles, presence and technological particulars of doorways and window openings are conditionally recreated. This reconstruction can be called incomplete or fragmentary.

3. At the time of excavation semi-decayed structures almost always have partially preserved evidence-features. However, all of them, except for the best-preserved parts or samples for dendrochronological analysis, have to be kept at the place where they were found, due to the complicated procedure of conservation and storage. The dimensions and particulars of each one of the details, and the order and mutual position of the rows of logs and conjugate angles are studied in detail and captured on photo, video and drawings. Thus a complete (full) reconstruction can be achieved.

4. One-hundred-percent-complete objects become museum objects, as a rule. Unfortunately, they are found rarely, mostly in kurgans containing ice. Excellent preservation of such samples allows researchers to conduct technical and technological studies at an ethnographic level. Reconstruction of such a sort becomes a standard.

It is important to take into consideration that in any reconstruction, two tasks must be solved. These tasks are reconstructions of the structure type (architecture – appearance of the object, elements, and details) and method of its creation (technology of parts and joints manufacturing, mounting of the structure).

In other words, in order to determine how this was done, it is important to study the surface treatment, corner joints, types of covering, etc. If these prerequisites are not followed, then as a result two completely independent types of reconstructions are obtained.

In addition, there also exist reconstructions of dwelling types using clay models, petroglyphs, written sources, ethnographic descriptions, and oral legends.

Naturally, all reconstructions put into scientific circulation have a right to exist, because they reflect various ways of reaching the truth. However, comparative-typological analysis within the detailed complex research of the technique and technology of woodworking requires well-reasoned, critical review of these structures, based on the complete correspondence of technical-technological data with the information taken from the original sources.

Experiment

Experiments constitute an integral part of technical and technological studies. As a criterion of truth, experiments allow researchers to follow the logic of real technological actions of ancient craftsmen and, among a variety of suggestions, to conduct natural selection of the expedient and rational. Scientific experiment includes physical (practical) and theoretical modeling.

Physical (replicative) modeling as a method of study of technical-technological aspects of various kinds of ancient manufacturing has been used successfully for a long time in Russian archaeology (Semenov, 1968; Minasyan, 1990; Glushkov, 1995; Borodovski, 1997). It is always conducted with orientation toward "living" ethnographical culture (Glushkov, 1995: 1; Kenig, 1995. 23; Tomilov, 1999: 26).

Researchers have found roots of physical modeling in the natural models for reproduction of originals in the art of the ancient Stone Age (Stolyar, 1985: 180 – 210).

Modeling of replicas includes the manufacture of both miniature and life-size copies. The most preferable copies for researchers are those closest to the original by all parameters

The chronometric definition of woodworking is a particular feature of the physical modeling method. In the course of this process, chronological spans of all of the technological operations of the treatment of material are recorded. Time is measured from the moment of the beginning of preparation for treatment to the completion of the object, using the same sort of wood as the original, and the same tools and methods as those used by ancient craftsmen. This is a very labor-consuming task, requiring a lot of material.

Theoretical modeling suggests the elaboration of a hypothesis, framing of theories and conjectures, analysis of possible solutions and their verification using data obtained through practical research.

Systematic and complex nature of the research

Research on the technique and technology of ancient manufacturing requires knowledge of systematic analysis (Gening, Borzunov, 1975· 42 – 72; Bobrinski, 1978: 14 – 19; Masson, 1990: 21 – 23; Derevianko, Markin, Vasiliev, 1994: 55 – 68; Borodovski, 1997: 40 – 41).

The necessity of a complex approach to the study of any archaeological object with the usage of strict conceptual and terminological apparatus is stipulated by the specifics of investigation of interconnected parts of an integrated whole (Gulyaev, Olkhovsky, 1999: 13). At the present time, for all the main types of ancient manufacturing (stone treatment, pottery and bone cutting, metallurgy of bronze and iron, etc) quite reliable methods of technique tradition study and material treatment technology have been developed.

Since woodworking is one of the most ancient types of production, it is necessary to develop special approaches to it and methods in the study of traditions of the material treatment. For a long time, Russian researchers have been conducting studies in this area.

The creation of methods of the study of ancient wood treatment is associated with the development of the single relatively universal system of complex analysis of unique archaeological material at all stages of research (field studies, conservation, restoration, laboratory studies, museum treatment, ethnographical observations, experiment) (Antipova, Raevski, 1991: 207 – 233; Volosova, 1994: 4 – 10; Glushkov, Borodovski, 1988: 26 – 41; Glushkov, Zakhozhaya, 1992: 127 – 129). The sequence of the main sections of the complex analysis should be composed as follows: development of a single terminology and system of characteristics of the researched objects; an exposure of the categories of woodwork, their internal division into units of aggregation and features that correspond with them; summing up data by each of the features; determination of the frequency and totality of the woodwork features at each of the sites; comparative analysis of two or more sites; group comparative analysis of the sites in terms of the features similarities and differences; grouping of the sites in accordance with the coefficient of the similarity of the features sum; intra-group comparative analysis of the woodwork features and determination of their mass or single nature with the purpose of exposure of the epoch (overall), regional (characteristic for some) or local (private, single) traditions of the wood treatment. Final typological analysis of the sum of the features of each of the sites shows the degree of closeness of the sites and, in a way, their ethnic similarity.

The idea of conducting a complex study of a large amount of the woodwork sources first came to light in 1991 during the archaeological research of the Scythian kurgans conducted by the international program "Pazyryk." In order to get true and full data, representative materials not only of Gorny Altai, but also of Kazakhstan, Tyva, and Mongolia were used. In the course of the research and experimental activities, a certain unified, quite effective and stable model of the technical and technological analysis of the wooden ancient objects was developed.

When taking as a base this approximate scheme of the system analysis of the woodwork, we were able to conduct relatively high-quality research of a large amount of sources. This scheme will certainly be defined more precisely, supplemented with new details, and perfected. At the same time, an extensive database on the woodworking traditions of ancient times will be formed.

Systematization of object categories and the complex analysis of the quality of treatment of materials and the level of the craftsmanship in the manufacture of artifacts have allowed the determination of common trends among craftsmen in terms of the serial production of wooden objects. Specialization was based in accordance with the labor division within each branch of woodwork industry and in accordance with the wide circle of technological aspects that have to do with the technique and technology of manufacturing (Pain, 1987· 12; Saiko, 1996: 8 – 13, Sokolsky, 1971: 48 – 256, 259 – 264).

The process of woodworking connected with home production had various specializations: *building trade* – treatment of large blocks of wood and construction of large objects; *carpentry-joiner work* – delicate treatment of the small cut and paneled half-finished products and their use in manufacturing household tools; *carving* (in most cases artistic carving) – a certain type of woodworking, which combined the elements of carpentry and joinery, requiring the knowledge of traditions of both trades and knowledge of knives and accessories (small chisels) used in the manufacture of various objects: toilet accessories, decorations, musical objects.

Specialization in manufacturing gives reasons to single out specific types of woodworking. During the early Iron Age, representatives of various cultures in North and Central Asia were familiar with the following types of wood treatment.

Building (carpentry) trade includes construction of dwellings (permanent, temporary), household facilities (winter houses, cattle pens, sheepfolds, barns), burial structures; fortified construction (frames for forts and fort walls); manufacturing of wall-breaking mechanisms, ballista, large mobile turrets on wheels; bridge construction; ship construction; temple construction.

Carpentry-joinery trade includes the manufacture of armaments (bows, arrows, quivers, axe handles, shields, knife scabbards, etc.); household objects (shovels, ladders, picks, wedges, wooden nails, instruments with handles, simple sleds, etc.), means of transportation (covered chariots, sleds, skis, boats), furniture (beds, tables, chairs, stools, armchairs), kitchen utensils (dishes of various kinds, goblet-like and glass-like vessels, vessels with noses, bowls, dippers, bowls, scoops, stirring sticks, etc.), toilet accessories (caskets, pencil cases, boxes, mirrors), ritual objects (burial boxes, bed pillows, shaman accessories, musical instruments (harp), etc.

Artistic carving was a special type of wood treatment including mostly the manufacture of adornments – sets for the decoration of people and horses (figures decorating headgear, aigrettes, diadems, necklaces, plates for belts, etc.).

The singling out of specifics of procurement and treatment of materials, and the approaches and methods of objects' manufacturing within every type of woodwork production process serve as a basis for the definition of traditions of material treatment.

The comparison of wood treatment traditions from various sites, cultures, and zones of their distribution allows the determination of the local, regional or epochal character of traditions and leads researchers closer to the solution of ethno-cultural and ethno-social problems.

The sequence of the steps in the study of ancient wooden material looks as follows:

1) determination of circle of the sources;
2) classification of materials by functional purpose;
3) basing on the above-mentioned identification of types of woodworking production;
4) revealing a technical-technological cycle within each type of woodworking production;
5) reconstruction of techniques and methods of manufacturing of various wooden items;
6) singling out morphological and technological traditions in every type of woodworking production, at all stages and in all operations of the technical-technological cycle;
7) correlation of results obtained through study of various sites, cultures and regions; singling out local, regional and epochal traditions;
8) solution of ethno-cultural and ethno-social problems;
9) usage of results obtained through the complex study as an additional source for determining relative chronology for dendrochronological analysis.

Conclusion

Woodwork production is one of the most ancient types of production. Its evolution was parallel to the development of stone processing and metallurgy of bronze and iron. Craftsmen working with stone and metal always paid great attention to the manufacture of tools for woodworking. The processes of tool production, and methods and techniques of material processing were always directly dependent on each other, forming a dialectic entity. Their interrelation and interdependence were imprinted in numerous evidence-features on surfaces of wooden objects.

Difficulties in the study of ancient wood are conditioned by different degrees of preservation of wooden objects and different informative values of sources, most of which are original (complete) objects with signs of tool treatment.

Graphical and experimental models (replicas) based on complex research of these sources are authentic and thus can be verified. Numerous reconstructions based on the analysis of secondary and indirect sources are less applicable to special studies in the field of technique and technology, since they contain minimal information about woodworking.

The development of uniform approaches to the study of ancient woodworking and bringing the main terms into sync will significantly facilitate the creation of a complex system of study of ancient woodworking.

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ARCHAEOBOTANIC FINDINGS AT MEDIEVAL SETTLEMENTS OF DZHETYSU*

Introduction

A particularity of modern archaeology is the wide application of natural sciences to studies of monuments of various epochs and regions, permitting the solution of problems of paleoecology, paleoeconomy, and ancient production technologies. Historical conclusions are made on the basis of study of the chemical composition of ceramics, microstructure of metals, analysis of vegetable macro- and micro-remains. Plants have always been an important resource for human life, being at the same time an indicator of life conditions. Studies of archaeobotanic material give unique information about the environment, agriculture, economy and nutrition of ancient people. Many plants (their leaves, roots, stems, fruits, and flowers) have been widely used by man – as food, for manufacture of tissues, mattings, and as ritual objects. The preserved floristic remains may serve as a source of information not only for paleoecological and paleoeconomic reconstructions, but also for studying rites and ceremonies, i.e., for reconstruction of the spiritual aspect of life of ancient people.

Methods and methodology of the study

Plant remains were collected by floatation of earth through sieves with various mesh diameters from floor layers, contents of vessels, ash pits, household bunkers, and ovens. The materials obtained are represented by carbonized cereal caryopsides and seeds of leguminous plants, stones of cultivated fruits, as well as by dried fruits and seeds or uncarbonized stones of weed and wild-growing fruit-bearing plants.

The study of plant remains found at archaeological sites started in the 1820s, but it was only in the 1950s that Helbaek proposed the name of the new scientific trend – "paleoethnobotany", detaching it from traditional paleobotany and stressing the elucidation of anthropogenous influences (Helbaek, 1955). Eighteen years later, Renfrew (1973: 1) defined paleoethnobotany as the study of remains of plants cultivated or used by ancient man and preserved under the conditions of archaeological sites. However, this definition is devoid of the aspect of ecological reconstruction, to which progressively greater attention has been paid over the last 30 years. The definition made by Popper and Hastorf (1988: 1 – 16) – analysis and interpretation of archaeobotanic remains for obtaining information about the interaction of man and plants – reflects modern research practice most fully. Another term, "archaeobotany", is also used, pointing out the only possible way of obtaining archaeobotanic material – through excavation of archaeological sites left from activities of ancient people. The choice of the term is determined by the traditions of various scientific schools and the tastes of individual authors.

The natural diversity of territories occupied by ancient people, as reflected in vegetation and floristic remains, is the most important key to paleoecological reconstruction. However, cultivated plants cannot be used for this purpose, because they were spread by humans, who created acceptable growing conditions by means of various agronomic methods (irrigation or drainage, fertilization, weeding, mechanical treatment of soil) even in unfavorable natural conditions, due to which they have spread far beyond their natural habitats.

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This is why wild-growing and weed plant species are used for this purpose. Among the latter, most information is contained in the remains of so-called synanthropic (literally, "concomitant with man") and ruderal (growing on desolated areas and dumping grounds) plants, since these reflect anthropogenous influence on natural landscapes. However, whereas remains of cultivated and weed plants are always present in some section of a cultural layer where they first came into the process of human activities, remains of wild plants (except those having nutritious, narcotic or any other economic value) are found rarely.

Any archaeological object is the result of activities of a concrete human collective and is therefore unrepeatable. At the same time, there is an assortment of characteristics that are common to different cultures, ethnicities, and chronological stages. There are many various archaeological objects whose archaeobotanic study permits obtaining new information about the tenor of life, traditions and economical relations of ancient peoples. Various types of archaeological sites (dwelling, social, ritual, and industrial constructions), and even various planigraphic elements of one building (floor levels inside it, foundation and road levels outside, contents of ash pits, kitchen middens, ovens, vessels, levels of buried soil and filling-up of burial pits) are characterized by different peculiarities of accumulation of archaeological material, which is reflected in its species composition and amount. The full complex of plant remains from one site or from a group of closely located sites makes it possible to carry out a reconstruction of vegetation, landscapes, climate and human economic activities, and if the sites date back to different chronological periods, to follow up the changes that took place during a certain time span. The natural vegetation will be represented more fully and adequately in samples collected at the level of foundations outside the buildings where seeds and fruits had been deposited under the influence of natural factors. The composition of samples taken from dwellings is accounted for by the preference of their inhabitants for certain species whose seeds and fruits were accumulated in larger amounts, which points rather to its significance in gathering or agriculture than to its participation in the vegetation cover. The same may be said about burials: natural vegetation will be reflected most adequately in samples from ancient buried soil; as for samples from the bottoms of burial pits, one can find there traces of plants that served as matting under the body, which already sheds some light also on the burial rite. Samples from floor layers of houses will contain remains of those plants that were used as food or for other purposes; in samples from hearths, caryopsides of cereals from which bread was baked will be often found. Carbonized caryopsides are frequent in ash and waste pits where ash from hearths had been thrown out. Peculiar chemical and microbiological conditions that developed in the process of filling up the pits contributed to preservation of stones of fruits (grapes, elder, watermelon, etc.) even in an uncarbonized state.

Paleoecological reconstructions

The Talgar settlement (medieval town Talhir) dating back to the 8th – 13th centuries, is situated on the right bank of the Talgar River where it emerges from the ravine at an altitude of 1,100 m above sea level and adjoins with its southern part to the piedmont of the first ridge of the Trans-Ili Alatau.* The central part of the settlement is surrounded by a subsquare rampart oriented to the cardinal points and having an area of 9 ha. Since 1955, the site was studied by Kopylov, and now is studied by Savelyeva (1994).

The archaeobotanic material was obtained from the premises of a farmstead of the 11th – 13th centuries in the region of the western gate of the site. The remains of cultivated cereals were represented by 18 caryopsides.

During 1999 – 2001, more than 200 stones of elder *Sambucus nigra* (Figure, *1*) were found at the site. Its natural habitats are riverbanks and forests affected by anthropogenous influence. That is why the great aggregation of stones (180 stones were found compactly in one place) points to exploitation of plant resources of nearby piedmonts and to the use of elder as food.

Two achenes of *Polygonum convolvulus* (Polygonaceae family) (Figure, *2*) found in the ash of a *tandyr* (an oven used for both heating and baking bread) point to the existence of wet places.

These data are supplemented by the results of palynological analysis. In the samples collected at the site, pollen of families Compositae and Chenopodiaceae is prevalent. Pollen of genus Artemisia (wormwood) is also present. It is often mineralized, which witnesses to unfavorable climatic conditions. Pollen of Rosaceae, Brassicaceae and Polygonaceae families is found. In the last, it was possible to determine also the genus and the species: *Polygonum persicaria.* Out of arboreal plants, conifers are represented: *Pinus silvestris* and *Picea.* Their pollen grains are strongly deformed, without any visible sculpture. Aquatic forms of Briales have been found.

The obtained palynocomplex characterizes the steppe landscape type with an insignificant participation of arboreal species. In mountainous ravines and valleys, pines, spruces and birches could have grown. Open spaces were occupied by wormwood-goosefoot groups and meadow grasses of Rosaceae, Polygonaceae,

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* All the sites described in this paper are situated in Dzhetysu, a geographical and historical-cultural region in southeast Kazakhstan.

Caryophyllaceae, and Brassicaceae families. There had been a water reservoir, probably of artificial origin. On the whole, the arid conditions and the looseness of the cultural layer on the monument do not contribute to preservation of pollen, which accounts for its small amount in the samples. The formation of sediments that include the palynocomplex obtained underwent arid climatic conditions, which is evidenced by the pollen of such xerophyte (drought-resistant) species as wormwood, and by the small size and deformation of pollen grains.

Settlements in the Talass Valley. Archeobotanic studies were carried out at one of the sites of the Akyrtas complex (the site was defined as a gerent's castle, and by *chirags* – green lamps with long spouts, faceted bodies and handles decorated with stamped vegetal ornaments – dated to the 12th – 13th centuries) and at the Ornek settlement (dated at the 10th – 12th centuries and corresponding to the Karluk city of Kulshub). The two sites were investigated by teams of the South Kazakhstan Complex Archaeological Expedition headed by Baipakov (1998).

The archaeobotanical complex of Akyrtas is represented only by cultivated cereals and leguminous plants whose caryopsides and seeds were discovered during the studies of floor layers and ash pits made in the floor. Out of wild plants, only nuts of corn gromwell *Lithospermum arvense* (Boraginaceae family) (Figure, *3*) and caryopsides of unspecified wild Poaceae cereals were found. Paleoecological reconstructions have therefore been carried out mainly on materials from Ornek where weeds prevail, while cultivated plants are represented by much smaller sample if compared with that of Akyrtas. Since these sites are spatially and chronologically close, their materials

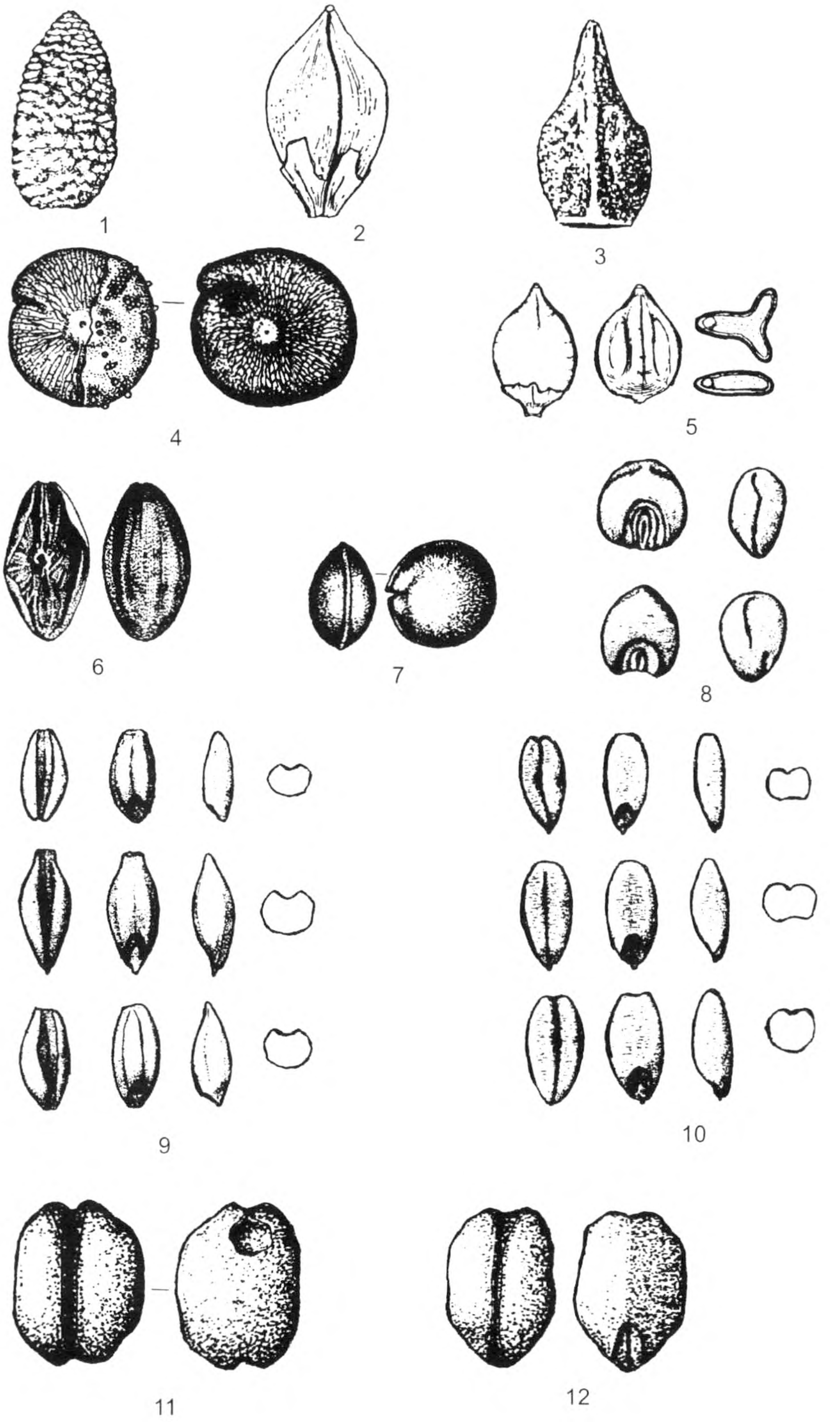

Figure. Plant remains from medieval settlements of Dzhetysu.
1 – *Sambucus nigra*, Caprifoliaceae family; *2* – *Polygonum convolvulus*, Polygonaceae family; *3* – *Lithospermum arvense*, Boraginaceae family; *4* – *Chenopodium album*, Chenopodiaceae family; *5* – *Polygonum persicaria*, Polygonaceae family; *6* – *Plantago lanceolata*, Plantaginaceae family; *7* – *Amaranthus albus*, Amaranthaceae family; *8* –*Hordeum vulgare distichum*, Poaceae family; *9* – *Hordeum vulgare distichum* var. *nudum*, Poaceae family; *10* –*Panicum milliaceum*, Poacea family; *11* –*Triticum compactum*, Poaceae family; *12* –*Triticum aestivum*, Poaceae family.

may be extrapolated to each other. The observed distribution of species is accounted for by the difference in the types of archaeological objects. At Akyrtas, the gerent's castle was studied, whose floor layers, household bunkers, ash and waste pits, naturally, contained much food refuse, including carbonized cereal grains and leguminous seeds. At Ornek, a mosque and a mausoleum were studied, i.e., not dwellings but cult constructions where ritual cleanness was maintained and therefore the occurrence of food refuse is very low; seeds of wild and cultivated plants could have been brought there only by chance during the construction or visiting of the buildings. Here, 4 samples with a total volume of 142 cubic decimeters have been taken. The number of species found is 25; out of them 6 were cultivated and 19 weed species.

Among the weed species, the first place is occupied by *Chenopodium album* of Chenopodiaceae family (Figure, *4*) which makes up 25% of all the seeds found at Ornek. This is a typical contaminant of cereal sowings, and its presence points to arable agriculture. It prospers also along roads, near buildings, on kitchen middens and in desolate places, reflecting the anthropogenous influence on natural landscapes which in this case has been rather durable, directed, and strong. The second place belongs to species of Polygonaceae family (17%), including *Polygonum patulum, P. Aviculare* and *P. hydropoper* (0.9% each), and *P. persicaria* (15.3%) (Figure, *5*). These plants prefer humid habitats and grow on riverbanks, along channels and *aryks* (canals) whose remnants are seen around the two sites. They witness to irrigation of plantations. The presence of pastures is indicated by findings of seeds of *Plantago lanceolata* (Plantaginaceae) (Figure, *6*) – a plant of clean lands fit for sheep, and *Lithospermum arvense* (Boraginaceae) The two species are characteristic of pasture meadows. The finding of *Amaranthus albus* (Amaranthaceae family) seeds (Figure, *7*) is interesting. This plant is found as a weed along roads, in plantations, fields and kitchen gardens, and in general on cultivated soils and in littered places. In the literature there are indications of its being brought from North America, which can have taken place no earlier than the 16th century However, the finding of *Amaranthus albus* seeds in Pleistocene sediments of Bashkortostan (Katz, Katz, Kipiani, 1965: 173) in a monument of the 10th – 12th century witnesses to European origin of this species. Three stones of elder *Sambucus nigra* may have appeared in the cultural layer as a product of gathering which, however, had a small significance in the Talas Valley. Stones of this plant have not so far been found at Akyrtas. The elder is a weed bush growing in desolate places, but demanding a moderate, not too arid climate. The dryness of climate in the Talas Valley limited natural habitats of this species to the mountainous zone and riverbanks. At Ornek and Akyrtas, caryopsides of wild cereals have been found in small amounts. In the modern vegetable cover of natural landscapes not disturbed by anthropogenous influence, wild cereals are widely represented.

Materials for paleoecological reconstructions are presented in Table 1.

The Antonovka settlement is identified with the medieval city of Kayalyk – the capital of Karluks, and since the 13th century, a Mongol city. It is situated in the Lepsa River Valley, in the piedmonts of the Jungar Alatau. The site was studied by the Antonovka team (Voyakin) of the South Kazakhstan Complex Archaeological Expedition headed by Baipakov. Excavations and sampling for archaeobotanic analysis were carried out in the territory of farmsteads, a bathhouse, a Buddhist shrine dated to the 13th century and a mausoleum referred to the late Middle Ages. In total, 22 samples were collected, with a total volume of 382 dm^3.

The samples from the territory of the mausoleum contain a large amount of seeds of ruderal plants: fat hen, black elder, sage (Lamiaceae family), European evening primrose (*Oenothera biennis* L., Onagraceae family). This may point to the fact that by the time of mausoleum construction the city buildings had already been destroyed and formed a vast wasteland with conditions fit for development of ruderal vegetation. At first, a grass cover represented by fat hen, European evening primrose and sage developed, and later on black elder bushes appeared. It is noteworthy that in the medieval layers under the mausoleum and on other objects the amount of seeds of ruderal species is very small, with the exception of bathhouse tubes – *kuburs* – contents. These contained the largest (as compared to other samples) number of fat hen seeds – about 1,500. However, the tubes became clogged with earth, most probably after the cessation of functioning of the bathhouse, i.e., when the city had already been abandoned by its inhabitants. The great number of elder seeds points to the fact that the late medieval population practiced gathering the fruits of wild-growing plants. The European evening primrose whose many seeds were found at the level of the mausoleum foundation is a typical weed of sandy soils, especially in fields and along roads, and is widely represented in the modern vegetable cover in the archaeological site.

The samples taken from the bottom of a Moslem burial pit of the late medieval mausoleum contain a very large number (a few thousand) of seeds of dodder *Cuscuta trifolii* (Cuscutaceae family). Synchronous layers in the territory of the mausoleum and around it do not contain seeds of this plant. Most probably, before burial the bottom of the pit was covered with a matting of dodder.

An earlier medieval period is associated with Karluk and Mongol conquests. At this time (12th – 13th centuries), a conspicuous place in the vegetable cover

Table 1. Materials on paleoecological reconstructions.
Settlements in the Talas Valley

Family, species	Absolute quantity	%	Habitats
Chenopodiaceae	**28**	**25.2**	Weeds in plantations, near dwellings and along roads on garbage dumps and desolate places, sometimes on sandy banks of water bodies. An indicator of anthropogenous influence on natural landscapes
1. fat hen (*Chenopodium album*)	24	21.6	
2. hybrid goosefoot (*Chenopodium hybridum*)	3	2.7	
3. polyspermous goosefoot (*Chenopodium polyspermum*)	1	0.9	
Boraginaceae	**1**	**0.9**	Weeds growing on dry meadow slopes, on the outskirts of fields, on fallow lands, in littered and desolate places
4. polyspermous goosefoot (*Lithospermum arvense*)	1	0.9	
Polygonaceae	**20**	**18**	Banks of water reservoirs, meadows, shallows, on plantations in humid places. Indicate the presence of water near the monument, and irrigation
5. water pepper (*Polygonum hidropiper*)	1	0.9	
6. spreading knotweed (*Polygonum patulum*)	1	0.9	
7. lady's thumb (*Polygonum persicaria)*	17	15.3	
8. climbing buckwheat (*Polygonum convolvulus*)	1	0.9	
Fabaceae	**2**	**1.8**	On vacant lands, solonchaks (soil salinization was caused by irrigation)
9. camel's-thorn (*Alhagi pseudalhagi*)	2	1.8	
Labiaceae	**3**	**2.7**	
10. hedge nettle (*Stachys annua*)	1	0.9	A weed in fallow fields and along roads
11. dead nettle (*Lamium purpureum*)	1	0.9	Mountain slopes and as a weed in fallow lands and along roads
12. dragonhead (*Dracocephalum nutans*)	1	0.9	On debris, stony and sandy soils
13. **Poaceae**	**4**	**3.6**	Clean places unaffected by economic activities
Plantaginaceae	**1**	**0.9**	Weeds in plantations; in meadows, point to their being used as pastures
14. buckhorn plantain (*Plantago lanceolata*)	1	0.9	
Nymphaceae	**1**	**0.9**	In humid places
15. brasenia (*Brasenia schreberi*)	1	0.9	
Amaranthaceae	**40**	**36**	A weed in cultivated fields
16. beet root (*Amaranthus retroflexis*)	40	36	
Caprifoliaceae	**3**	**2.7**	A shrub, including as a weed in desolate places
17. *black elder* (*Sambucus nigra*)	3	2.7	

around Kayalyk was occupied by species of Boraginaceae family – *Lithospermum arvense* and *Lycopsis arvensis* which grow on borders of fields and on fallow lands as well as on dry pasture meadows. On the basis of these findings, it is possible to establish the trends in the production economy and the land management in Kayalyk: fallow agriculture and pasture cattle breading. *Chenopodium album* and *Oenothera biennis* are present in small numbers, which witnesses to a not very long anthropogenous influence on the landscapes. The occurrence frequency of Polygonaceae seeds is low, but this rather points to peculiarities of cultural layer formation than to the absence of humid habitats. Materials on paleoecological reconstructions are presented in Table 2.

Peculiarities of agriculture

The proportion of cultivated cereal species is different at different sites.

Agriculture in Talgar was based on cultivation of barley *Hordeum vulgare* L. – 12 caryopsides have been found. Five of them had a symmetric form with a shallow abdominal ridge widening towards the apex, which permits attributing them to the two-row chaffy barley (Figure, *8*). Four of them were also symmetric, but had a narrow deep ridge and no flowering glumes, which is characteristic of two-row naked barley (Figure, *9*). Only one caryopsis has signs of six-row naked barley.

The second place with respect to numbers is occupied by millet *Panicum milliaceum* (Figure, *10*).

Found least of all was wheat. All the 5 caryopsides were short and wide, with the length to width ratio of 1.5 and morphologically corresponded to the dwarf variety of common wheat *Triticum aestivum* ssp. *compactum*.

Additional data on the agriculture were given by analysis of phytoliths carried out by Golyeva. In the samples, phytoliths of barley, millet, oat and rice were found. While for rice only phytoliths only those formed in the husk of caryopsides were recorded, for barley, millet and oat those formed in the stems were also found. Therefore, the millet, barley, and oat were cultivated locally, while rice was imported (Golyeva, 2001: 73)

The materials obtained at Omek are not sufficient for definite conclusions about bread production – it seems that it was based on cultivation of genetically identical dwarf and common wheats – *Triticum aestivum* ssp. *compactum* and *Tr. aestivum* ssp. *aestivum* (Figure, *11*, *12*) with a hexaploid chromosome set (possibly, in mixed sowings). Surprising is the absence of barley, because it seems to have dominated at the neighboring synchronous Akyrtas. Millet *P. milliaceum*, like at Akyrtas, is widely represented and occupies the first place among cultivated cereals – 67%. Two stones of grapes *Vinis vinifera* are scarcely enough information to answer the question whether the grapes had been cultivated on the spot or imported from outside, although a wine-making farm was found in the neighboring medieval Kulan. On the basis of the three stones of pear *Pyrus communis* and four stones of apple *P. malus*, it is also difficult to come to a strong conclusion about whether the inhabitants of Ortek had a gardening experience of their own or whether it was a result of gathering wild-growing fruits.

Somewhat more information about agriculture is provided by the Akyrtas findings. Here, drought resistant cultures with a short vegetation period prevailed – panicle millet (50%) and two-row chaffy barley (26%). Represented were also some other barley varieties – six-row chaffy(10%), two-row and six-row naked (4% each) barley. Then came dwarf (5%) and common (1%) wheat.

The settled production economy of Kayalyk was based on cultivation of cereals and legumes The samples taken from *tandyrs* and around them at the level of the floor are very rich in cereal grains and legume seeds. The contents of ash pits and waste pits also contain them in large numbers, which points to the way of formation of these deposits – accumulation of ash from *tandyrs* and kitchen refuses with burnt grains and seeds The caryopsis size is larger than that of those found at the Talas Valley sites, probably due to a milder and more humid climate. A characteristic feature of cereal collection is the prevalence of wheat – 178 caryopsides making up 67% of all the cereals. Among the wheats, dominant was dwarf wheat – 119 caryopsides, the second place being occupied by the genetically related common wheat, and 3 caryopsides had a very rounded form and looked like round-grained (Indian) dwarf wheat Barley had a smaller significance and is represented mainly by the two-row chaffy variety A surprising fact is the almost complete absence of millet, especially in the light of the recent finding of a vessel filled with dried spikes of panicle millet with decayed caryopsides. In 2001, only 3 panicle millet caryopsides and 2 of an unclear morphology which did not allow definite attribution to the panicle millet or to the Italian millet were found. A legume culture that had an absolute importance is the field pea – 69 seeds out of the 80 legume seeds. The common lentil is represented by 7 seeds. Two alhagi seeds and one seed of field pea belong to wild legumes. Cereal and legume plantations usually make up a crop rotation, the legumes following the cereals and enriching the soil with nitrogen. As noted above, a fallow agriculture system was used. The sowings became contaminated by fat hen, corn gromwell and *Lycopsis arvensis*. Gathering in the Middle Ages is witnessed to by stones of raspberry (bilberry?) found in large amounts in the contents of garbage pits. At the same time, there are scarce stones of European elder; probably, it occupied a modest place in the medieval vegetation. The presence of raspberry stones permits speaking of the existence, in the vicinities of Kayalyk, of bush vegetation that developed on fellings, in ravines and on the banks of water bodies.

It is noteworthy that the contents of waste pits (*badrabs*) having the form of gray-greenish loose fine-clot sandy loam, often, and in large amounts, include uncarbonized stones of fruit and berry crops that have conserved their natural color: at Kuiruk-tobe, *badrabs* abound in stones of grapes, water melon and *jida*, at Antonovka these are stones of wild species of Rosaceae and some other families. These findings may serve as a reason for making conclusions about the use of fruits of these plants, about the peculiarities of formation of such a deposit type as *badrab* contents, and about special physicochemical conditions in them which contribute to conservation of organic matter.

Archaeobotanic studies have permitted concluding that medieval Kayalyk was surrounded by fields, meadows and bushes along riverbanks and *aryks*. In the vicinities of the city, manifold economical activities were practiced: on the basis of a long-fallow system, cereals and legumes were grown, the meadows were used as pastures, and the landscapes unaffected by intensive economical activities were used for gathering.

Conclusion

The use of archaeobotanic methods in archaeology is rather promising, since it allows introducing into research methods new materials that earlier have escaped the researchers' attention. On the basis of studying plant remnants from medieval sites of Dzhetysu, it has become

Table 2. Materials on paleoecological reconstructions. Antonovka settlement

Families, species	Absolute number		Habitats
	EMA	LMA	
Fabaceae	**3**	–	
1 field pea (*Pisum sativum*)	2	–	A weed in plantations of cereals and legumes, sometimes as a cultivated plant
2 camel's-thorn (*Alhadi pseudalhagi*)	1	–	Vacant lands, solonchaks (soil salinization caused by irrigation)
Boraginaceae	**336**	**3**	Dry slopes of hollows, outskirts of cultivated fields, and in fallows In settlements, on garbage dumps and desolated places
3 corn gromwell (*Lithospermum arvense*)	278	1	
4 common gromwell (*Lithospermum officinale*)	17	–	
5 wild bugloss (*Lycopsis arvensis*)	39	2	
6 stickseed (*Lappula squrrosa*)	2	–	
Polygonaceae	**10**	**5**	Banks of water bodies, meadows, shallows, in sowings in humid places Point to water bodies near the monument, or to irrigation
7 lady's thumb (*Polygonum persicaria*)	5	–	
8 knotweed (*Polygonum aviculare*)	3	3	
9 climbing buckwheat (*Polygonum convolvulus*)	1	–	
10 water pepper (*Polygonum hidropiper*)		2	
11 curly dock (*Rumex crispus*)	1	–	
Chenopodiaceae	**1762**	**670**	Weeds in fields, near dwelling places and along roads, in littered or desolate places, sometimes on sandy banks of water reservoirs An indicator of anthropogenous influence on natural landscapes
12 fat hen (*Chenopodium album*)	1751	–	
13 goosefoot (*Chenopodium urbicum*)	1	–	
14 orach (*Atriplex* gen)	10	–	
Rosaceae	**542**	–	Forests, shrubs, fellings, riverbanks, In settlements along fences, near dwelling buildings
15 raspberry (*Rubus idaeus*)	542	–	
Labiaceae	**28**	**25**	
16 sage (*Salvia*)	26	25	Dry steppes and mountain slopes
17 ayuga	1	–	
18 hemp nettle (*Galeopsis*)	1	–	A weed on fallow fields, in kitchen gardens, in littered places
Cruciferae	224	4	Weeds in plantations, near dwellings and along roads, on garbage dumps
19 turnip (*Brassica rapa*)	224	4	
Onagraceae	**51**	**9**	Along roads on sandy soil
20 evening-primrose (*Oenothera biennis*)	51	9	
Compositeae	**2**	–	Along roads on sandy soils, in fields, pastures, near dwelling buildings
21 spiny cocklebur (*Xanthium spinosa*)	2	–	
Plantaginaceae	**1**	–	On pasture meadows, along roads
22 buckhorn plantain (*Plantago lanceolata*)	1	–	
Cuscutaceae	–	**7000**	In plantations and, under natural conditions, as a parasite on other plants
23 dodder (*Cuscuta trifolii*)	–	7000	
Caprifoliaceae	**69**	**97**	In forest outskirts, among bushes, along roads and as a weed
24 black elder (*Sambucus nigra*)	69	97	

Note EMA – Early Middle Ages; LMA – Late Middle Ages

possible to carry out paleoecological reconstructions, to reconstruct ancient landscapes and determine the ways of their evolution, to estimate the anthropogenous influence on nature, to elucidate the specificity of development of agriculture (composition of cultivars, agriculture systems, adaptation to local ecoclimatic conditions) in the vicinities of some cities Different proportions of cereal species point to the fact that medieval farmers used to take into account the local climate conditions. In the arid Talas Valley, with annual precipitation of 250 – 350 mm, preference was given to cultures with a short vegetation period – millet and barley;

Table 3. Ratio of sizes of cereal caryopsides from settlements in the Talas Valley and Antonovka

Akyrtas and Ornek			Antonovka		
Length, mm	Width, mm	Length/width	Length, mm	Width, mm	Length/width
Dwarf wheat – *Triticum compactum*					
6	4	1 5	5	3 5	1 4
4 5	3	1 5	4	3	1 3
4	3	1 3	4 1	3	1 36
4	3	1 3	3 5	2 9	1 2
4	3	1 3	4 2	3 2	1 3
3 9	2 7	1 4	4 5	3 5	1 28
4	2 5	1 6	5	4	1 25
4	3	1 3	3 7	2 5	1 5
			5	3 2	1 56
			3 5	3	1 16
Common wheat – *Tr aestivum*					
4	2	2	3 5	2 1	1 6
4 5	2 5	1 8	5	3	1 6
2 5	1 5	1 6	5	3	1 6
4	1 8	2 2	3 5	1.7	2
4	2 5	1 6	5	3	1 6
5 5	3 5	1 6	5 3	3	1 76
4	2 5	1 6	7	3 5	2
			5 5	3 5	1 57
			5	3	1 6
			5	3	1 6
			5	3	1 6
Two-row chaffy barley – *Hordeum vulgare distichum*					
6	2 5	2 4	7	3 6	1 94
7	2 5	2 8	7	3	2 3
6	2 2	2 7	6 5	3 2	2
7	4	1 75	5 5	2	2 75
6	3	2	6 5	4	1 62
6	2	3	6 5	3 5	1 85
6	2 5	2 4	6	3 5	1 71
6	3	2	6	3	2
6	3	2	5	1 8	2 8
6	3	2	5	1 8	2 8
			5	2 5	2
Naked two-row barley – *Hordeum vulgare distichum* var *nudum*					
4	2	2	4	2 1	1 9
5 5	2 5	2 2	6	2 5	2 4
4 5	2	2 25	4 5	2	2 25
4	1 5	2 6			
5	2	2 5			
5 5	3.5	1 57			
5 5	3	1 8			
6 5	2	3 25			
3 5	2 2	1 6			
4 5	2 5	1 8			
Naked six-row barley – *Hordeum vulgare hexastichum* var *nudum*					
7	2	3 5			
6	4	1 5			
6	3	2			
5	4	1 25			
Chaffy six-row barley – *Hordeum vulgare hexastichum*					
7	3 5	2	5 4	2 5	2 16

in the more humid Lepsa Valley in Jungaria, wheat was preferred, while barley occupied the second place. Caryopsides of cereals from Antonovka are larger, longer and wider (Table 3) than those from the sites of the Talas Valley, which points to more favorable cultivation conditions. At Akyrtas, unlike Antonovka where two-row chaffy barley was absolutely dominant, this cereal is represented by a larger diversity of varieties: here, multirow and two-row, naked and chaffy variants are present. If one considers this fact within the framework of N.I. Vavilov's concept of the equivalence of modern territories with a great variety of species of a particular plant to the focus of origin of the given crop in ancient times, then the Talas Valley may be considered as one of the foci of barley domestication. However, this hypothesis needs corroboration by the results of archaeobotanic studies of monuments of still earlier epochs where caryopsides of barley with morphological characters transitional from wild to cultivated varieties must be found.

Interestingly, the economical activities of the population of medieval cities of Dzhetysu, gathering wild fruit crops that had special importance in the northeastern part of the region, has not lost its significance.

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AN ESSAY ON THE SIBERIAN SHROVETIDE: SEIZURE OF A SNOW FORT*

Introduction

The present work is dedicated to the analysis of the major traditional scenarios of the Siberian Shrovetide (*Maslenitsa*) including the ritual of a "snow fort seizure " The author has attempted to consider this calendar ritual as a text, specifically regarding it as a "masculine" text in the Siberian cultural tradition.**

Cultural traditions of the Russian population in Siberia have developed over several hundred years, since the annexation of its vast territories in the 16th century. From that time until as late as the 20th century, many pre-Christian and pagan beliefs had been preserved among the Siberian peasantry. In fact, Makarenko, the author of a well-known study of traditional Siberian calendar rituals, wrote that he was astonished by the "surprisingly archaic" customs and traditions of the Russian Siberian people (1913: 10 – 11). Numerous examples of the survival of these archaic beliefs led to the phenomenon of a Slavic paganism revival under the unique conditions of Siberian "liberty", far from the "watchful eye of Moscow." However, in the opinion of Sagalaiev, the reasons and the scope of this phenomenon were not sufficiently investigated. For example, it has not yet been established whether this revival of Slavic paganism was influenced by the surrounding spiritual atmosphere of Siberia's indigenous pagan population.*

The traditional festive rituals of the Russian pioneers in Siberia, a territory regarded as a periphery of the Christian world, acquired certain features, which were hardly explainable in terms of the development neither of inherited European Russian traditions nor of direct contact with indigenous populations. These new features appeared through the actualization of archetypes in the consciousness and behavior of Siberian peasants. The practice of the "snow fort seizure" serves as an example of traditional entertainment practiced in Siberia during the Shrovetide. The famous Russian artist, Vasily Surikov, illustrated this tradition in one of his paintings. Surikov spent his childhood in the Yenisei River region and expressed his impressions of this popular rite in his work (Fig. 1) M. Voloshin wrote that this picture depicted a wide range of Shrovetide attributes: a low wide sleigh, patterned shaft-bows, and little Valday bells...and most importantly, the faces of simple Siberian people. With their whole-hearted smiles, no signs of depression or spiritual weakness could be traced on the faces of these strong people (1985: 131 – 132).

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** Originally, "masculine" and "feminine" texts within traditional festival scenarios were distinguished within wedding rituals. Wedding scenarios definitely represent a contrast in the bride's and the bridegroom's roles. On the basis of the noted contrast, the wedding scenario has been perceived as a dialogue. The text of this dialogue consists of two separate parts a "masculine" and a "feminine" text (M-text and F-text) (see (Levinton, 1991· 211, 213))

* Korshunkov also described the causes of the durability of pagan beliefs among the Russian population in Siberia. He wrote that in the course of colonization of the northern territories, as well as the Volga River basin, the Urals, and Siberia, the Slavic people communicated with people of different religious backgrounds, many of which were pagans These contacts led to a *revival* (italics by **G.L.**) of ancient relics of paganism among the Russians themselves Thus, a life side by side with the alien population helped preserve ancient traditions (1999: 152, etc)

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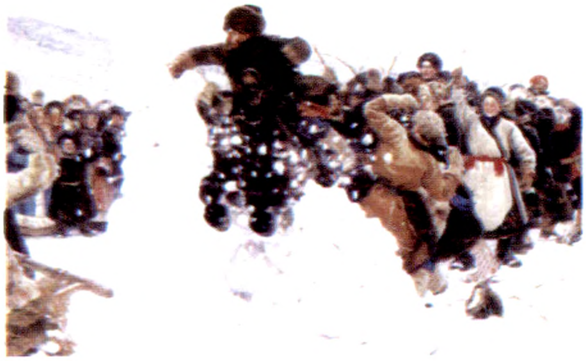

Fig. 1. V. Surikov. Sow fort seizure. 1891 (a fragment).

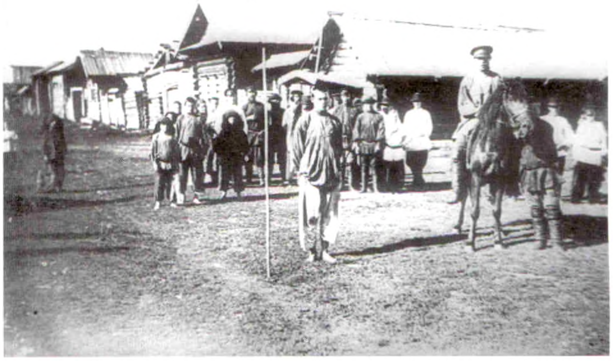

Fig. 2. Sport competitions between a pedestrian and a cavalier. East Siberia, the Angara Region. 1904 (Photoarchives REM, file 773, N 74).

While the game of holding a snow fort was not particularly popular in European Russia, in Siberia this widely celebrated form of entertainment became a typical feature of the Shrovetide carnival. It is noteworthy that Russian people who lived their entire lives in Siberia would associate this game with real events in the history of Siberia's settlement. Krasnozhenova wrote that people connected this rite with "combats of the Cossacks with the troops of the indigenous populations besieging Russian forts" (1924: 26). Certain folklore researchers agreed with the latter that such a rite appeared as a result of "adding a heroic connotation" to calendar rituals practiced by the Russian pioneering population in Siberia (Melnikov, 1984: 71).

Traditional scenario of the festival and its variants

A markedly active masculine role is a major characteristic in the traditional scenario of this festival in a typical Siberian peasant community. As a result, a "masculine text" of the carnival has been formed. Preparation for the carnival included the construction of ice-hills, the responsibility of young unmarried men, and the organization of various sport competitions (human and horse races, wrestling competitions, etc.) in which the entire adult male population took part (Fig. 2). Finally, the culmination of the carnival's festivities was represented in the sendoff ceremony of *Maslenitsa*, an event prepared for long before its celebration. Decorations, costumes, and other special items were made for the Shrovetide procession; some people were appointed to play specific roles in this ceremony (Gorodtsov, 1915: 18). Scenarios of the sendoff ceremony differed, however, with respect to the representation of the *Maslenitsa* itself: whether it was represented by either an anthropomorphic scarecrow or by a dressed up peasant. Let us discuss both variants of the scenario.

In European Russia, women used to make the *Maslenitsa* scarecrow bearing pronounced female features (Sokolova, 1979: 25 – 27, 37). For this reason, many researchers regarded the image of the Russian "Lady *Maslenitsa*" as a "universal representation of basic feminine features" (Bernstam, 1988: 270). In contrast, the Siberian scarecrow was made mostly by men, giving it markedly masculine features. Researchers have described the scarecrow as "a man of straw dressed in a traditional male garment" with a pipe in its mouth (Arefiev, 1901: 138; Makarenko, 1913: 145). In either case, even if the *Maslenitsa* scarecrow was given the appearance of an old woman, it still wore certain elements of a male costume. The *Maslenitsa* is traditionally represented by a scarecrow of varying size, sometimes the size of a small child, while other times taller than a full-grown man. The body is made of old clothes stuffed with straw and personifies an old woman. It wears a shawl on its head, and a man's torn hat or cap. It is dressed in a shirt and a skirt, sometimes wearing torn male trousers together with the skirt (Gorodtsov, 1915: 18).

The Shrovetide procession was usually followed by a group of masked-men (*skomorokh*). The "maskers" – both married and unmarried young men – were dressed in fur coats turned inside-out, torn caps, and wore old winter boots (Makarenko, 1913: 145 – 146; Gorodtsov, 1915: 21). Musicians dressed in military garments like the Cossacks, "generals" and "marshals," amused the spectators by playing tambourines, fiddles, accordions, and balalaikas (ARGO, Sec. 62, file 1, N 3, p. 7; N 8, p. 21 reverse – 22); (Shirokov, 1855: 50 – 51)). Participants of the *Maslenitsa* procession, similar to Christmas maskers, simulated various craft and

Variants of descriptions of the *Maslenitsa* train
(second half of the 19th – beginning of the 20th centuries)

Maslenitsa as a man of straw	*Maslenitsa* as a masked peasant
The *Maslenitsa* train consists of six sledges tied together One of the sledges bore a barrel, in which a pole 7 – 8 arshins* long was erected, a carriage wheel was attached to the top of the pole. A *man of straw* (italics by **G.L.**) with a pipe in its mouth wearing a male dress *lopot* was placed on the wheel A white sail was attached to the pole (Arefiev, 1901 138) A "*man of straw*" (italics by **G.L.**) in a male garment is placed in a "special carriage composed of 2 – 3 sledges tied together In the middle of this carriage, a pole of 9 – 10 arshins is erected with a wheel attached to the pole A man of straw is bound to the wheel in a sitting pose holding a bit of butter, a bottle and a glass" (Makarenko, 1913. 145) A carriage for *Maslenitsa* was usually made of a discarded sledge A small old boat is adjusted in the sledge. a dais is established of old rotten boards with a throne for *Maslenitsa* In the center of the boat, a pole with a wheel on its top is erected A "good *Maslenitsa*" personified by a *man of straw* (italics by **G.L.**) is sat on the throne (Gorodtsov, 1915. 18 – 19)	A *Maslenitsa* carriage is made as follows. horses are set in a sledge, which is sided with worn out mats In the center of the sledge, a pole about 8 arshins high with a wheel on top is established Lady *Maslenitsa* is sitting on the wheel The role of Lady *Maslenitsa* is played by a *man* (italics by **G.L.**) with a sooty face dressed in the most ridiculous attire Driving along the village, he pulls up at certain houses, according to his selection, where he is treated with wine and rewarded with money" (ARGO, Sec 62, file 1, N 3. p 7, N 8, p 21 reverse – 22) A carriage consists of 4 – 6 large chests attached to each other and planked with boards .. In the center of the carriage, a high pole with a horizontally attached wheel on top is erected A *clown* (italics by **G.L.**) sits on the wheel amusing the spectators by making faces, crowing, barking, and mewing (Shirokov, 1844 51) During the Shrovetide, "masked-men used to go in a sledge carrying a pole with a wheel. A *man or a woman* (italics by **G.L.**) was situated at the pole's crossbar A boat with oarsmen was constructed on a sledge Sometimes, a woman with a spinning wheel sat down in a basket and sledged along the streets it was a "Lady *Maslenitsa*" (Krasnozhenova, 1924 25) **

* An arshin is 71 12 cm

** Such *Maslenitsa* traditions have survived until recently among the Russian people in Siberia "a pole with a wheel attached to its top was established on a cart A *man* (italics by G.L.) sat on the wheel and sang short humorous songs" (interviewee A M Shakurova, born in 1919, a resident of Malyshevo, Suzun District, Novosibirsk Province)

housework chores. Usually from ten to twelve men rode in a *Maslenitsa* train made up of several sleighs tied together. Along the way they performed small shows: "a person dressed as a smith is whetting a scythe. By his side, men are breaking straw (representing the process of breaking tow, a coarse fiber made of flax). Men are washing linen in a wash-tub and milling charcoal in a mortar" (Arefiev, 1901: 139). The *Maslenitsa-man* with a person dressed as a military leader (*waywode*) "are simulating a bath-house procedure" (Gorodtsov, 1915: 27); an "old woman" is sitting on a bench in a sleigh spinning tow, an old man is standing behind her shaking his fists – for the sake of the spectators' amusement (ARGO, Sec. 59, file 1, N 17, p. 77). This evidence supports Ivleva's point of view that the earliest available information on the *Maslenitsa* carnival in Siberia, and in European Russia, proves that it was primarily men who participated in the festival (Ivleva, 1994. 105).

The destruction of the *Maslenitsa* man of straw was the final culmination of the scenario, ending the carnival. A description of the carnival in the Tiumen district withstands that when the procession rode out of the settlement, "the attending people rush towards the scarecrow and tear it into pieces, scattering it over the road. After the destruction is over, the pieces are put into a pile and burned" (Gorodtsov, 1915: 28).

The second variant of this holiday scenario required a man to play the role of *Maslenitsa*. Usually an experienced person, one who knew the ritual in full detail, was appointed to be *Maslenitsa*. Additionally, he needed to be a quick-witted, sprightly local citizen (Ibid · 20; Novikov, 1929: 178). Such a smart and animated person, usually a local healer, story-teller, or folklore singer, was always ready to make jokes at the townspeople's remarks. Clearly, he equated himself with *Maslenitsa* and acted on behalf of this character (Gorodtsov, 1915. 20 – 21).

In summary, two variants existed in the representation of the *Maslenitsa* image of the Russian Siberian tradition: an anthropological doll or a masked townsman The question of the equality of both symbols in representing a single mythical creature in a historical perspective is still open. Ivleva (1994· 102 – 103) argued that this question could not be resolved at the present stage of knowledge.*

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* It should be noted that this question must be resolved with regard to available data on the spring-summer cycle of rituals, which are characterized by various ways of representation of one and the same mythological images by women of a peasant community rather than by men (a review of various viewpoints see in (Lubimova, 1998· 76 – 78, 2001: 187)).

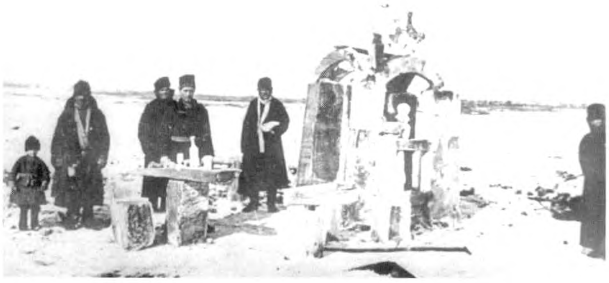

Fig. 3. A *Maslenitsa* snow fort. The Yenisei Region. Early 20th century (Photoarchives REM, file 1060, N 11).

It is interesting that the construction of the *Maslenitsa* train was the same in both variants. This construction represented a number of sleighs of various types tied together. One of the sledges bore a pole with a wheel, to which the *Maslenitsa* doll was attached and on which the *Maslenitsa*-masked-man was sitting (see Table).

It is noteworthy that the whole construction looked like a sea boat, the pole being its "mast".*

Baiburin argued that certain details of the *Maslenitsa* ritual including erection of the pole, preparation of an anthropomorphic figurine and its consequent destruction, led to the perception of the whole ceremony as a typical ritual of sacrifice in front of the world tree, in which the victim represents the material for the reconstruction of the Universe (1993: 152, etc.). The situation became ambiguous, however, when a human being acted as the *Maslenitsa.*

Available materials allow us to hypothesize that when a sacrifice was impossible, the scenario with a snow fort (Fig. 3) was chosen, including the destruction of the snow fort and the ritual torture of the winner. Thus, the *Maslenitsa* scenario involved two possible developments: the destruction of a man of straw, or the seizure of a snow fort. A combination of these two major trends has not been noted in any Siberian local traditions.

Contests for a snow fort seizure usually took place during the last day of Shrovetide. Zobnin (1894: 64) wrote that during the day of mutual forgiveness before Lent people constructed and ruined fortresses, made of ice and snow on a river or on a city square. Zobnin also wrote, that "people gathered to watch the show before the sunset... In the past, a literate peasant read some legends about *Maslenitsa,...* a gluttonous creature, who wasted a lot of pancakes with butter and fish" (1896: 541).

In other local traditions, this character was called a "tsar", which approached the snow fort in his birthday suit, smutty with soot, and uttered a speech "full of witty and frivolous jokes". Upon the end of this speech, he announced the start of the battle for the snow fort (Novikov, 1929: 176, 178). The role of the naked "tsar" was not finished with the beginning of the battle. Popov (1866), a priest, witnessed that "during the seizure and destruction of a snow fort... a completely naked person, who had driven dressed up horses" writhed in hysterics during the whole battle "expressing some sort of pity and sorrow."

The tradition of the snow fort seizure was preserved in full by the Russian old-residents, those settlers who have occupied the Siberian territory for more than 200 years (the most recent record of the possible variants of this game are from the Altai, see (Dubrovskaya, 2001)). The game itself included several stages. The participants were men, mostly young, unmarried individuals subdivided into two parties: "assailants" and "defenders", the former being mounted, the later on foot. The defenders would stand in front of the fort, while the assailants pushed their horses to gather speed in order to pass through the artificial obstacle made of twigs and sticks. "The game lasted until the fort had been seized" (ARGO, Sec. 61, file 1, N 23, p. 49 reverse – 50) (Makarenko, 1913: 143).

The seizure itself occurred in the following way: "a group of horsemen rushes to attack the fort. Attacks last until... one of the horsemen races through the arch of the snow fort." With the sounds of drumming, hundreds of boys "with deafening shouts destroy the fort to the base in seconds" (Shirokov, 1844: 53 – 54). One should note that the destruction of the fort was a necessary ending of this game, though, as Gorbunov stressed, there was no necessity for it (1994: 111).

A peculiar way of celebrating the winner was an important feature of the final part of the game: "should a horseman succeed in racing into the fort" but not destroy it and escape the defenders, the later "would pull him down from the horse, throw him on the ground, and fill his mouth with snow" (ARGO, Sec. 61, file 1,

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* Carnival carriages reminiscent of sea boats were widely used in the towns. In Irkutsk, during the last days of the *Maslenitsa* carnival a special carriage was made of several peasant sledges. A construction resembling a sea boat was formed on the sledges. The boat was decorated with seals and flags of various colors. On the boards, clowns *skomorokhs*, a performing bear, musicians and drummers made their show. The entire construction was pulled by 10 or more horses (Avdeyeva, 1849: 227).

Following Anouchin (1890), who described the sledges, boat, and horses as characteristics of a funeral ceremony, the majority of other researchers also regard these accessories of the *Maslenitsa* train (in particular the boat) as features typical in funerals and perceive the whole procession accordingly (e.g., (Gromyko, 1975: 102, 105)). On the other hand, there is a differing interpretation on the origin of this ritual. According to it, sea boats constructed on sledges appeared in the *Maslenitsa* processions only after a tremendous festival that was held in Moscow in 1722 when Peter the Great celebrated a peace treaty conclusion with Sweden (Tultseva, 2000: 161).

N 23, p. 50).* A horseman who had managed to get into the fort was subjected to an even more severe torture: "Spectators run down a mounted winner, pulled him down from the horse, and "washed" him in the snow, i.e. filled his attire with snow until he lost consciousness. Other accidents also occurred with the happy winner: sometimes the crowd would break his leg or arm. Upon the end of the torture, the winner was brought round and the community offered him alcoholic drinks (Novikov, 1929: 176). In addition, evidence of bathing the winners in ice-holes has been recorded from European Russia (see (Krasnozhenova, 1924: 35)).

Discussion

In the author's point of view, the rite of injuring the winner represents an important characteristic in the ritual of the *Maslenitsa* snow fort seizure. Literary sources provide several explanations of this phenomenon. Sokolova (1979: 24, 50 – 52) interpreted the habit of the youth to wallow in snow as a remnant of the agrarian magic cult. However, she did not find sufficient grounds to relate the popular Siberian game of snow fort seizure to some other archaic rituals. On the contrary, Vetlitskaya (1978: 92 – 93, 123, 127) argued that the *Maslenitsa* competitions and tobogganing represented transformations of the archaic "ritual of gathering with fathers" including the rite of "requital of blood for the predecessors." Bolonev (1975: 152) believed that the *Maslenitsa* fighting between opposing groups of people, including the opposition of the two parties in the snow fort game, represented certain archaic traits and originated from a dual organization of ancient society. Lipinskaya (1996: 186) correlated the *Maslenitsa* habit of "washing winners in snow" with the rite of ablution of yule masked-men on the Epiphany, interpreting the *Maslenitsa* ritual as cathartic.** However, the compulsory character of this bathing, together with the absence of repentance from the part of the main hero, allows us to reject the suggested interpretation.

Let us figure out the possible candidates for the winner of such competitions, who were ready to endure the torture incurred from this process. One possible hypothesis is that these were mostly "unmarried and recently married young men" who sought public recognition. Representatives of this social category were the primary heroes of the *Maslenitsa* games and competitions. It is noteworthy that according to community regulations, the young couples, who got married during the preceding period, used to go driving on Shrovetide (e.g (Gorodtsov, 1915: 17)). Special public attention to the newly married couples was reflected in the form of various trials, mostly typical for the Northern Russia and the Upper Volga regions. For instance, a young husband was subjected to beating and whipping. One more trial consisted of tobogganing, when up to ten men climbed over each other into a toboggan, the newly married husband being at the bottom of the heap. The *Maslenitsa* masked townspeople used to bury newly married couples in the snow (Bernstam, 1988: 64). Snow in the latest example, as well as in other examples referred to in this paper, seems to have been perceived as a special symbol of agricultural-productive magic forces.

Thus, mostly young men, both of married and unmarried status, represented the principal heroes of Shrovetide games and competitions. It was an opportunity for them to demonstrate their physical health and strength to the community. Such excellent physical condition was necessary for these young men not only for labor and fighting, but also for the successful continuation of their family lines (Gorbunov, 1994: 112). In fact, according to Bernstam (1988: 93 – 95), sport competitions like equestrian tournaments, snow fort seizures, and fisticuffs may be perceived as relics of "masculine unions of warriors" demonstrating certain archaic forms of ritual military-competitive behavior. The noted hypotheses are in accord with Gorbunov's point of view (1994: 110), who argued that such competitions might be perceived as elements of initiation rituals for young men during later stages of this tradition.

The practice of swarming up a pole for a prize attached to its top represents a specific variant of snow fort seizing, and it too may be interpreted in terms of initiation rituals. Zobnin (1896: 541 – 542) describes this custom as follows: "In the center of town, a long pole is erected. A new shawl is bound to its top... Someone wishing to obtain the shawl would then appear." Sometimes, such a pole was erected instead of a snow fort. The pole was traditionally called a "fort". Archival records provide the reader with the following description: "At the outskirts of a village, mostly on a frozen river or a lake, a high pole, from 3 to 5 *sazhens* long [1 sazhen = 2 m 13 cm], is erected. The upper portion of the pole is soaked with water; sometimes coated with lard. A bottle of wine or a shawl is bound to the top; sometimes a rooster or a piglet serves as a prize. On the last day of Shrovetide, crowds of peasants gathered together around this *fort* (italics by **G.L.**). Some townspeople expressed their wish to seize the fort, meaning to swarm up the pole and get the prize" (ARGO, Sec. 61, file 1, N 25, p. 8) (see also (Novikov, 1929: 178)).*

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* The recent Chaldon (the Russian old residents in Siberia) tradition holds, that the defenders of the snow fort used to throw snow at the assailants "Men used to stand by the sides of the snow fort gate and throw spade-fulls of snow at the approaching horsemen" (interview, S.V. Chepchugova, born in 1917, resident of Tashara, Moshkovo district, Novosibirsk region)

** Ponyrko expressed a similar interpretation. She interpreted this ritual from the point of view of Christian symbolism She argued that the period beginning from the Shrovetide until Easter should be regarded as a single cycle "illustrating the path from a simple human to an imperishable deity." Certain *Maslenitsa* festivities bear features of sport competitions, such as wrestling and the snow fort seizure. The winner of the snow fort game was forced to bathe in an ice-hole. Should the whole procedure be based on the Easter idea of life and death, the reward would make sense, otherwise it is perceived as a paradox. Bathing in an ice-hole would be a rule rather than a paradox, water (a characteristic symbol in Christianity) being perceived as "a divine basis on the path from Adam to Jesus Christ" (Ponyrko, 1984: 193, 195)

Swarming up a vertical axis represents an integral part of many initiation rituals (including a ceremony of induction into shamans) among the indigenous peoples of Siberia. Chernetsov reported on remains of an initiation ceremony among the Khant people belonging to the family of the Winged Old Man (an eagle) on the Ob: upon reaching a certain age, a young man was driven to a sacred place of the family where he was forced to climb a tree, on which a winged predecessor of the clan lived. Old men stood on the earth and uttered conjurations consisting mostly of good wishes. Having descended from the tree, the young man was considered a full member of the clan (Chernetsov, 1959: 143). The Buriatian people had a similar tradition of induction. A long and thick birch tree was erected in the yurt of the initiated person. The top of the birch was then led out of the yurt through a smoke hole. Local shamans gathered together in the yurt and prayed to god-protectors, while the initiated person repeated the spells, holding a sabre symbolizing the shaman gift from "Heaven". In some cases, the initiated person had to climb up the tree out of the yurt and sit on its top, praying out loud to his patrons (Dugarov, 1991: 34 – 35).

The symbol of the World Tree, representing a semantic center and a basis of the Universe sphere, constitutes an integral part of many religious systems. The image of the World Tree was associated with an annual rebirth and renewal of nature as well as with the continued procreation of life in the human world. Korovina (1995: 297 – 304) argued that moving up the vertical axis to the border with the Upper World and then descending to the Middle World possibly represented a temporary death and the subsequent resurrection of the initiated person.

The Russian tradition of swarming up the pole during the Shrovetide may also symbolize the granting of certain valuables from the Upper World. The "prizes" served as material representations of such grants. It should be stressed that these two parallel traditions should not be interpreted as Russian borrowings from local cultures of indigenous Siberian peoples. On the contrary, this Russian tradition represents the actualization of specific archetypes of consciousness and typical behavior of the Russian peasantry, which populated the periphery regions of the Christian World, while at the same time shared their living space with the aboriginal pagan population.

Conclusions

Formerly, Shrovetide coincided with the New Year celebration in the Russian tradition. Consequently, Shrovetide bore features of the major annual holiday of Christmas-tide. With a certain degree of conventionality, these two holiday cycles may be perceived as two parts of a single ritual. In the course of the first part, during the Christmas-tide, the surrounding world was deprived of its habitual features. The boundaries between "one's own" and "alien" vanished, and the "situation of collapse" emerged (Baiburin, 1993: 150). The second part, i.e. the Shrovetide, was characterized by a "creation of a new semiosphere", while the destruction of the ritual symbol was perceived as a necessary precondition for the springtime revival of the Earth together with a general renascence of the Universe (Ibid.: 151).

Examinations of the calendar rituals referred to in the present paper have shown an absolute predomination of male participation in the ceremonies. Bernstam (1988: 268) argued that the rituals associated with the winter solstice period had masculine semantics, mostly expressed in rounds through homesteads performed by groups of men. Given the "identity of Christmas-tide and Shrovetide cycles" (Ibid.: 270), we may state that in Siberia, unlike in European Russia, the predominant masculine role in calendar rituals reached its culmination during Shrovetide. In this respect, the shows performed with household utensils, like spinning-wheels, brakes, hammers and anvils, mortar with charcoal pieces, wash-tubes, etc. by the characters of the *Maslenitsa* train, may be perceived as a carnival representation of symbolic simulations of divine creation and basic daily operations.

Another supposition can be made concerning the particular attention that had been paid to the newly married couples and especially to young married men during the Shrovetide. The newly wedded couples were the focus of various trials and competitions. Such games as a snow fort seizing and swarming up a pole seem to have served as tests of the potential of new community members and represented particular initiation rituals on the eve of a new agricultural period associated with fertilizing of the earth.

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* Later records do not provide evidence that such poles were perceived as elements of snow fort seizing. Thus, A.S. Totolina, born in 1915, resident of Petelino, Yalutorovski District, Tiumen Province, narrated: "During the Shrovetide, poles 7 – 8 m high were erected Balalaikas or boots were bound at the top of these poles. Young men swarmed up the poles to unbind the prize." It should be noted that in the local tradition, the ceremonies of *Maslenitsa* festivities were designated with an idiom "to unbind a *Maslenitsa* "

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COMMON SALT IN HUMAN DIET: HISTORICAL ASPECTS

Introduction

Why is salt so important for the human organism? Why does it play a key role in vastly diverse cultural traditions? Why does man become addicted to it so rapidly?

The answers to these and other questions concerning salt can only be speculative, at best, at the present time

Many animals are known to have experienced an occasional acute physiological need for salt. This, of course, does not concern carnivores, which are able to extract a sufficient amount of salt directly from the tissues of their prey. It is herbivores that really need salt. Reindeer migrate over long distances to reach the coasts where seawater is available.

A constant intake of sodium chloride (or rather of available chlorine-containing substances) is essential for the secretion of hydrochloric acid and gastric juice. A considerable amount of sodium ions is needed to maintain bodily homeostasis. One of the most widely used homeostatic indicators is the level of NaCl in blood plasma. It is the concentration of salt that provides for a permanent level of osmotic pressure. To make the potassium-sodium pump work is one of the basic biochemical functions of cells.

About a third of all the sodium contained in the organism is found in the mineral component of skeletal tissue, and some 2% are inside the cells. Most sodium is contained by blood plasma (Deetjen, 1996). At present, people in most developed countries tend to consume much more salt than medical standards require, resulting in a high rate of arterial hypertension and the increased risk of various diseases affecting adults. Numerous medically approved dietary systems with a limited amount of salt are widely practiced. Salt then causes addiction and can thereby be deleterious Why has man agreed to pay this price? What circumstances might have caused this addiction?

Sources used

Turning to the use of drugs, which stimulate brain activity in a peculiar way, we notice that this practice is universal and is rooted in man's powerful urge to experience vivid psycho-emotional states. This urge gave rise to likewise universal and fundamental manifestations of ancient ideology.

Salt, in some sense, provides a parallel. Food tempered with salt has a more distinct and "vivid" taste. Etymologically, Russian words, such as *solyony* (salty), *sladky*, or *solodky* (sweet), have one and the same root, meaning "tasty". Certain idioms ("the salt of the earth"), the rite of offering bread and salt to demonstrate hearty welcome, and omens (spilled salt as a sign of imminent quarrel) attest to the fundamental role played by salt in diet and life.

Most people today consume salt on a daly basis. However, this is not the way it has always been. Salt must have begun to occupy the key role in culinary practice at some time in the past. Even today some foraging populations make do without salt. This, for instance, concerns the Eskimos and Chukchee, who never used salt until the mid-1900s. Instead, they consumed dried or chilled meat and fish. They also practiced various techniques of preserving meat, fat, and plants such as algae and reindeer moss. One method was to soak these in blood for further fermentation. Leather sacks or stomachs of animals were used as receptacles. Alternatively, meat and fish were kept in special pits for a long time (Bogoraz, 1991; Ratzel, 1903).

Therefore, it was proved that animal food can be preserved in various ways without salt. Moreover, the nutritive value of food subjected to these treatments is exceptionally higher. As noted above, animal tissues that have not been boiled and contain blood are rich in salt.

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Based on general facts concerning the chemical composition of animal and vegetable tissues, it can be suggested that the physiological need for salt was caused by man's shift to a vegetarian diet, on the one hand, and by the custom of boiling food, on the other. In the process of boiling, a large amount of salt dissolves. If boiled food is eaten without the broth, the intake of salt is insufficient. Moreover, boiled food, unlike raw food, is rather tasteless and requires spices.

All the above brings us to the conclusion that salt began to play a key role in diet and culture during the early Neolithic when pottery became widespread, making it possible to cook and store liquid food. Additionally, the share of vegetable products in rationing increased, mostly due to cereals Relevant sources are, admittedly, quite scanty. It remains to test whether or not the distribution areas of specialized agriculture coincide with outcrops of salt. Clearly, salt mining was urgent, mainly for the inhabitants of inland areas, whereas the coastal dwellers made do with salt, albeit a bitter kind, which they extracted from seawater by boiling.

Sodium chloride exists on the Earth in both solution and mineral forms. The name of the mineral, halite, stems from the Greek word *hals*, which means either "salt" or "sea" or "seawater". This alone indicates that seawater was indeed one of the most accessible sources of salt, at least for the Greeks.

The largest and the best-known deposits of halite are situated in the South-Central region of the USA (Kansas, New Mexico, Texas, and Oklahoma), forming a 1000-km-long belt, 240 to 400 km in breadth of meridian. Other deposits include those in Punjab, India (stretching along the southern slopes of the Himalayas), in Strassfurt, Germany, Wieliczka, Poland, Alsace-Lorraine, northeastern France, Cheshire and Propshire, Britain, as well as in Romania, and Spain (Kurs mineralogii, 1936). All these deposits have been known since time immemorial, and no exact evidence as to the beginning of their exploitation is yet available.

Another source of salt is saltwater lakes. The largest of which is Lake Victoria in central Australia. Others are the Great Salt Lake in Utah, USA and Lake Tabriz in Iran (Ibid.).

Studying the role of salt on the basis of archaeological finds is quite difficult The content of sodium chloride in human bones is very unstable because of being heavily affected by diagenetic processes. The concentration of chlorine in human bone tissue, on the other hand, is rather stable (Deetjen, 1996) and does not depend on normal variations of salt consumption.

Based on archaeological data one can reconstruct ancient salt mines and salt-extraction centers (see, e.g., (Rathje, 1971)). Historical sources, folklore, and economical statistics, too, are informative. The latter indicate that in the early 1800s, the output of salt was the highest in the USA followed by Britain and Russia, whereas China and India produced less salt than did Germany.

Given the high population density in China and India, it can be inferred that salt consumption rates in East and South Asia were much lower than in developed countries of Europe or in the USA. The lifestyles of the great Asian nations suggest that low consumption of salt has always been their traditional intrinsic feature. In his famous *Mineralogy for Everyone*, Fersman (1937: 87) wrote that an average person consumed six to seven kilograms of salt yearly. In central Africa, however, salt bears the same cost as gold. In China, salt was procured from springs by letting water run along bamboo pipes and heating the boiler by burning natural gases. According to Fersman, the average *per capita* consumption of salt in China was four kilograms, much below the medical standard. Also, polished rice, known to be poor in vitamins and minerals, was the staple food in central agricultural areas of China.

Stuzhina (1972: 138), in her essay based on 12th – 13th-century Chinese sources and on her own journey to China in the early 1950s, writes that flavorless farinaceous food was the principle one with other foods and spices being just occasionally added. Only the rich could afford to supplement this bland food with meat, fish and hot salty snacks, whereas common people made do with a handful of salted vegetables or germinated beans. Her analysis of food trade in Chinese markets reveals that the lists of food items did not include salt, evidently at that time, as in modern China, where salt is not normally put on the table. Instead of a saltcellar, a cup of hot salty sauce was used at meals. Salty vegetables and dried fish were eaten as well Salt-extraction included the production of pure crystalline "blue salt" and low-quality, poorly rectified yellow salt (Ibid.: 141).

This scanty information suggests that, traditionally, inhabitants of Mainland China consumed very little salt over several centuries.

The idea that the production and consumption of salt was related to large-scale cultivation of starchy cereals is consistent with facts concerning salt extraction in the New World. The analysis of Mayan trade in pre-Columbian Mesoamerica has made it possible to trace the tendencies in this sector of economy over 1,500 years (Gulyaev, 1976).

The Maya inhabited vast territories falling into three cultural and geographical regions: northern Yucatan, north central Guatemala, the southern highland areas and the Pacific coast of Guatemala, highland Chiapas, and part of El Salvador. The northern region is arid and poorly suited for agriculture, while coastal areas abound in salt deposits. Coastal ecosystems are also rich in fish and mollusks.

From the shift to intense agriculture (1st millennium AD, the Classic Period) onward, salt trade was on the rise. Salt was transported from southern highland Guatemala to the central area. The latter abounds in rivers, which served as communication routes connecting the principle parts of the territory. Excavations in Tsibilchaltun, a large town on the Yucatan coast, revealed traces of large-scale salt-extraction. Fine decorated ceramics found in the cultural layers of the site were imported from Peten, the central region (Ibid.).

In the 2nd millennium AD, salt-extraction continued to feature prominently in Mayan life. In AD 800 – 1000, towns of Peten lost their leading positions. From that time on, the most important towns were those of the Yucatan with its peculiar system of land use. New trade routes emerged including a long and complex sea route along the Yucatan coast to the rich areas of Guatemala and Honduras (Ibid.: 71).

The importance of trade is demonstrated by the emergence of professional merchants who transported and sold goods of high demand, instead of being engaged in agriculture or crafts. A developed salt trade existed until the European conquest. Diego de Landa (1994: 205), one of the first Europeans to describe Mayan life, wrote that trade was the main occupation. The Maya exported salt, cloth, and slaves. Archaeological data suggest that routes of salt trade were quite stable and did not change over very long periods The reason was that they were essential for human communication.

Apart from sea salt, the ancient Maya obtained salt from salt lakes. De Landa noted:

> One marsh in Yucatan is especially noteworthy as it is more than 70 leagues long and salty throughout. God has created the best salt I have ever seen in my life, and once crushed, it is quite white, as informed people say. It is so good that as little as half a celemin of it is enough to salt more than can be salted with a whole celemin of salt from elsewhere. In this marsh, our Lord has created salt from rainwater rather than from seawater, because the sea is not connected with the marsh and is entirely separated from it by a strip of land. When it rains, the waters in the marsh rise, and the salt condenses into large and small lumps resembling pieces of molten sugar. Four or five months after the rains, when the lagoon had dried somewhat, the Indians used to procure salt by collecting these lumps in the water and carrying them to the land for drying. They also observed a custom of not collecting this yield of salt without permission from those elders who had claimed a territorial right to these places. Everyone who came to collect salt gave some gifts to these elders, either salt itself or some other items (Ibid.· 211 – 212).

From the standpoint of ecology, territories with well-developed agriculture cannot posses rich resources of salt cannot at the same time. There are virtually no plants in existence which can be cultivated on saline soils. On the other hand, based on physiological regularities, the increase of vegetable food rationing inevitably results in the need for a supplemental intake of salt.

One more point related to salt trade or, in fact, to any trade of imported goods, should be noted. "Often, the most venerated religious centers were major trade centers as well. Thus, each year, numerous pilgrims from Tabasco, Shicolango, Champoton, and Campeche, gathered at the sacred places on Cosumel Island off the northeastern coast of the Yucatan. If Royce and Schouls are right claiming that these people were both pilgrims and merchants, this would support the idea of a sea route around the Yucatan" (Gulyaev, 1976: 67). A special role was played by trade in indispensable items imported from remote areas. Salt, indeed, must have played such a role for major agricultural states, tribes, and territories.

Archaeological data, then, indicate that the transition to specialized forms of cultivating cereals and the cooking of farinaceous food increases the need for salt. It may be suggested that the preservation of food using salt is secondary with respect to the salting of vegetable food.

Understandably, the salting of farinaceous food and the association of bread (rather than meat or fish) with salt has acquired a deeply symbolic meaning. The gospel episode describing the Last Supper is illustrative in this regard. According to Matthew, "When it was evening, he sat at table with the twelve disciples; and as they were eating, He said, "Truly, I say to you, one of you will betray me." And they were very sorrowful, and began to say to him one after another, "Is it I, Lord?" He answered, "He who has dipped his hand in the dish with me, will betray me" (Mt 26.20–23). According to Mark, "And as they were at the table eating, Jesus said, "Truly, I say to you, one of you will betray me, one who is eating with me." They began to be sorrowful, and to say to Him one after another, "Is it I?" He said to them, "It is one of the twelve, one who is dipping bread into the dish with me" (Mk 14.18–20). Luke does not mention this episode; instead, he mentions some connection between the cup of wine and the treacherous apostle: "And likewise the cup after supper, saying, 'This cup which is poured out for you is the new covenant in my blood. But behold the hand of him who betrays me is with me on the table'" (Lk 22.20–21). John gives the most detailed account: "It is that the scripture may be fulfilled. He who ate my bread has lifted his heel against me.... It is he to whom I shall give this morsel when I have dipped it." So when he had dipped the morsel, he gave it to Judas, the son of Simon Iscariot. Then after the morsel, Satan entered into him. Jesus said to him, "What you are going to do, do quickly." (Jn 13.18–27). Comparing the fragments, we conclude that the cup on the table was used for dipping pieces of unleavened bread. The dipping itself is highly symbolic because Judas is thereby revealed as a traitor. Apparently the dish in which bread was dipped contained brine. The sources of the latter might have been salt lakes or underground waters.

An important study by Cassen (2000) suggests that certain funerary vessels from the megalithic constructions in western France were used for storing brine. This again points to the symbolic meaning of salt and brine in the past.

Detailed evidence concerning salt-extraction and salt deposits is available from the Russian Empire. Because Russia's reserves of salt are the world's largest, it would seem that no problems should arise with its supply. In Russia, all the three varieties of naturally occurring salt are represented: mineral, sedimentary (from salt lakes), and that found in underground saline springs. Historical and archaeological data provide some information concerning tendencies in salt-extraction, salt trade, and the consumption of salt in Russia in the past. Apparently, the earliest evidence attesting to the use of large amounts of salt concerns the account of salting fish in Greek colonies of the northern Pontic. Some sources mention large reserves of salt near Olbia, where inhabitants of Tauria (the Crimea) used to purchase it Strabo (VII: 4, 7) notes that a large salt lake was situated near Chersonesos. There are many smaller salt lakes in the same area, and they were evidently the best sources of salt during the dry seasons. Sedimented salt was detached, collected, cleaned from silt, and carried to Chersonesos by boats. This raw material required further processing (Kadeyev, 1970). Herodotus (IV. 53) notes that in the mouth of the Borysthenes (the Dnepr) large quantities of salt were being collected

In all these regions, salt-extraction was mostly related to salting fish. In Chersonesos, Olbia, Tyritake, and Myrmekion (Kruglikova, 1975) as well as in other colonies on the northern Black Sea coast, huge tanks for salting fish were discovered

Salt fish trade apparently brought Bosphorus large profits. As early as the 4th century BC, this item of Bosphoran import was famous in Greece. Later, the Romans considered Pontic salted fish a delicacy (Ibid.).

During the heyday of the fish salting industry, the annual output of salted fish in Tyritake, the major center of fishing industry, was ca 1,280 tons. The production attained its peak in AD 200 – 300. From the 4th century AD onward, more and more fish-salting tanks were being abandoned. They do, however, appear in medieval occupation layers of Crimean towns such as Tyritake and Myrmekiîn (Ibid.). The tradition, then, proved rather robust.

Such level of production required stable sources and transportation routes. Perhaps salt lakes in the inland and northern Crimea were the principal sources, although any support of this idea has not been found in the available archaeological publications.

As the archaeological studies carried out by Boltrik (1990) indicate, Crimean salt lakes provided a source of salt not only for Crimea itself, but for southern Russia and the Ukraine as well. Based on the location of major burial mounds, Boltrik (1990: 37) concludes that the line of mounds on the left bank of the Dnepr, south of Kamenskoe fortified settlement, virtually coincides with one of the two old Russian "salt routes" along which, in later periods, salt was transported by carts to the left-bank of Ukraine from Lake Sivash. The tendency to use ancient routes for transporting salt continued until the construction of railways, as noted by Minns. Zabelin, who intended to excavate the Oguz mound in 1865, reported to the Archaeological Commission that:

One hundred versts south of the Chertomlyk mound, already on the left bank of the Dnepr, there are three very large mounds arranged in a line... People say that long ago highwaymen living on a mound used to stop caravans of carts loaded with salt and rob their drivers It is here, then, that the salt route passed." Another branch of the salt route led south along the left bank of the Dnepr down to Kakhovka and thence via the Black Valley steppe to Perekop. Archaeologically, this route can be traced from the Belozerka Period onward, and this may be why the earlier Scythian mounds such as Velikaya Znamenka and Malye Lepetki, are situated along it. Perhaps already in the 5th century BC, this route played a very important role (Boltrik, 1990: 37).

While Boltrik concludes that the major trade route from Crimea to the Ukraine and to Russia might have been used for transporting salt in the early Iron Age, thus satisfying the Scythians' need for salt, the issue is still a matter of debate.

The use of salt by the Scythians was discussed by Gavrilyuk (1987, 1999). She writes that Scythian nomads must have been closely familiar with salt because it is the most important mineral nutritive for sheep. Herodotus notes that in the Borysthenes mouth huge reserves of salt accumulate in a natural way. Boiled meat was salted (Gavrilyuk, 1987: 28). It is hard to imagine a nomadic tribe traveling with large amounts of salt for sheep. Seasonal migrations to the mouth of the Dnepr in winter might have been prompted by the need to bring the herds to the "salty coast".

Zhukovskaya (1976), in her study addressing the diet of Central Asiatic tribes, provides no evidence supporting the idea that salt has been widely used by modern pastoralists. Traditionally, meat is boiled without salt and is salted after being boiled. Salt plays the same role, as do other spices with which meat is tempered: wild onions, garlic, and certain other spicy and aromatic plants.

Certain other salt routes existed, which produced a considerable economical and political impact on the history of some regions of Russia. Especially important for European Russia were numerous deposits of salt in northern and northeastern areas. These are deposits from which salt was procured by boiling, a technique most commonly used in Russia. A review of historical evidence concerning salt-working in northern Russia was compiled by Vorozheykina (2000), who notes that the first mention of salt-extraction on the White Sea coast was made in a bill issued by Prince Svyatoslav Olgovich in 1137 and in règulating taxation on salt-extraction. Even earlier, in the 11th century, one of the largest Eastern European salt-extraction centers began to function: Wieliczka, Poland (Kurs mineralogii, 1936).

During the late medieval period, salt-extraction developed in Staraya Russa, Perm, Solikamsk, Vychegda, Tot'ma, on the Solovetskie Islands, on the White Sea coast, as well as in more southern areas of Russia such as Yaroslavl and Nizhni Novgorod regions, and in Soligalich, Kostroma region. Production level was the highest in the Perm Region due to an inexpensive water route along the Kama and Volga. I was unable to find any figures illustrating the output of salt extracted in the Middle Ages either by boiling or by halite mining or by collecting naturally sedimented salt. Indirect evidence suggests that the key role in Russia was played by salt sediments and saltwater springs. Large salt-extraction centers in the Perm Region are known from the 16th century on (Rossiya, 1898). An encyclopedia published in 1898 gives some information illustrating the tendencies of the output of salt during the 1880s. In 1881, the principal source of salt was natural sediments (1814 tons, or 59%), the largest amounts being extracted in the Taurian Region (the Crimea). Salt produced by boiling, mostly in the Perm Region, was the second most important (1027 tons, or 33%). Only 256 tons of mineral salt were extracted (8%). By 1887, the pattern changed. Not only did the total amount of salt output increase, but also the proportion of various sources shifted in a radical way: sedimentary salt, 2957 tons (52%), mineral, 1402 tons (24.5%), extracted by boiling, 1342 tons (23.5%). The exploitation of mineral salt deposits, then, increased more than five-fold.

As noted above, the total number of various deposits of salt on the Earth is enormous. This is all the more amazing because history abounds in examples where shortage of salt became so acute that people were ready to pay virtually any price for it. Curiously, in Russia, whose reserves of salt are the world's largest, salt had long been an item of import. Judging by the late 19th-century statistical data, in certain years the amount of imported salt was more than a quarter of that produced in Russia itself. Britain and Portugal were permanent exporters of salt to Russia in 1898. Only in 1881 did Russia begin to export salt.

According to some sources, Russia's largest mineral salt deposit, near Iletsk, south of Orenburg, the Urals, was discovered in the 1400s (Kurs mineralogii, 1936). Fersman gives somewhat different information:

Seventy kilometers south of Orenburg, a lonely gypsum rock, long known as Iletsk Outpost, towers above the open feather-grass steppe. The extraction of salt, whose snow-white pieces protruded out of the ground at the foot of the rock, began as early as 1741. Numerous caravans of carts crossed the Yaik* as early as 1775, and met here to transport salt from that place elsewhere. During the Pugachev revolt, a stockade on top of the rock failed to protect Orenburg from being captured by Pugachev's comrade-in-arms, Khlopusha.

From that time on, Iletsk was gradually abandoned and due to the complete lack of roads, the extraction of salt declined sharply and was on the verge of collapse (1937: 117).

The extraction of salt in the Orenburg Region was connected with the history of the Uralian Cossacks. Pushkin, during his work on *The History of Pugachev*, used the rich archives of the Orenburg Frontier Commission, including *The Historical and Statistical Review of the Uralian Cossacks* by Levshin. This document gives a detailed account of the origin of this population group, its lifestyle, and sources of existence. Possibly, because the Uralian Cossacks had migrated from one major river (the Don) to another, fishing was an important part of their economy. Levshin writes, "We will now address the fishing practiced by people of the Uralian Host and describe it in detail both because it is the principal and virtually the only source of their income and because various fishing techniques are quite particular" (see (Pushkin, 1958: 281)). Levshin goes on to give a vivid and full account of seasonal fishing and its rules, and cites some fishing episodes.

Prices of fish and caviar were defined by various factors. Firstly, "prices during the harpooning season are incomparably higher than are those during the spring season when they are four times below (one immediately recollects the winter caravan of carts with fish – the most expensive one at that season – which Michail Lomonosov accompanied by foot to Moscow from Archangel Region – **M.K.**). Fish from the former season does not keep unless it has been salted. Uralian Cossacks procure salt either from Inderskoe and Gryaznoe salt lakes near the frontier in the Kirghizian steppe, or from lakes situated on the banks of the Emba. Also, there are smaller salt lakes near Uzeni" (Ibid.: 293).

According to Levshin, Cossacks preferred sedimentary salt to the mineral kind. It is hard to say whether this was due to the proximity of the salt lakes or to same old tradition.

Certain folklore texts are relevant for traditions and techniques of salt-extraction. One of the Russian folk tales recorded by Afanasyev is titled *Salt* (topos N 242) (Afanasyev, 1985). The story is as follows. A merchant has three sons. The two elder ones are reliable and diligent, whereas the younger son, named Ivan, is a sluggard and a drunkard. The father loads the elder sons' ships with expensive goods while entrusting the younger one with the cheapest cargo: planks and logs, which he is supposed to squander and drink anyway. The storm drives Ivan's ship ashore of an unknown island where he finds a mountain of a "pure Russian salt". Ivan does away with his father's cargo, loads the ship with salt, and sets sail. Soon he reaches an island where no one is familiar with salt, so all the food is tasteless. Ivan tempers the tsar's dishes with salt, which is much enjoyed by the tsar who then asks if he might buy the Russian salt. Ivan makes a profitable deal by selling all the salt at the price of gold and silver. Having done that, he abducts the tsar's daughter and they luckily continue the voyage together. But then, they are overtaken by the elder brothers, who argue about the girl and over the gold and silver after having thrown Ivan overboard. At this point he makes use of one of the logs he had previously discarded. Having nearly reached an island, Ivan is swallowed up by a giant fish and stays inside its belly for three days after which the monster disgorges him onto the shore. Subsequently, with the help of a giant sorcerer, Ivan returns home and settles all his problems with his father, brothers, and bride.

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* Yaik, formerly the Ural River.

Firstly, the tale was recorded in Archangel Region, a place of traditional salt-extraction and navigation There are no indications that it circulated anywhere else in Russia. Notably, the salt mentioned in the legend is mineral rather than sedimentary, or extracted by boiling. Secondly, the discovery of salt, the encounter with a giant, and the episode with a fish (an evident allusion to the story of Jonas and possibly to other archaic motifs) sets Ivan apart from his brothers and suggests that he was the chosen one.

The Czech folk tale *Salt* contains an episode where the principal character, the king's younger daughter, compares her father with the most important thing in the world: salt. Offended by this trivial parallel, the king drives the girl out of his house. Subsequent events, however, demonstrate the genuine depth of her feeling. The girl grows rich because a sorceress reveals a secret to her of the salt palace. Most importantly, contact with salt imparts special qualities to the heroine who becomes capable of magic transformations.

Conclusions

Our analysis may help answer certain questions asked in the beginning. The answers may only be tentative, though.

In various parts of the world, in various periods, but always following the transition to specialized agriculture, salt became a physiologically indispensable component of the human diet. Perhaps in regions where the shift to new forms of economy occurred earlier than elsewhere and coincided with early forms of paganism with their inherently strong tendency for the symbolization of reality, salt became part of an especially rich symbolism and was integrated into various mythological systems. Its unusual properties, including the capacity to rapidly crystallize and dissolve, to be palatable and, as doctors claim, even to have a sweet taste in low concentrations, while at the same time being hot, caustic, and resembling a taste like that of blood, although colorless (all diametrically opposed), are highly meaningful, since the earliest and basic forms of human cognition reflect reality precisely as a system of binary opposites (Ivanov, 1987).

If the physiological need for salt is less acute, as in the case with nomadic pastoralists or hunter-gatherers, who consume enough sodium chloride with animal food and are not as tied to their place of residence as are agriculturalists, or if the shift to specialized agriculture occurred later after the principle mythologemes had formed, salt is viewed as a source of wealth and is thus interpreted in rational terms. As a number of examples cited above demonstrate, salt trade is one of the powerful factors in the emergence of a communication network. The importance of salt for earlier periods, then, is comparable with the importance of spices during the period of the great geographical discoveries.

Universal and simple techniques of preserving animal and vegetable food by means of salt have engendered a powerful tradition. As a result, acute shortage of salt became tantamount to famine. The imposition by Morozov of an additional tax on salt in 1645 resulted in the "Salt Revolt" of 1648. After the uprising had been put down, the 1649 Assembly of the Land (Zemsky Sobor) introduced new legislation.

The case of salt makes it evident that basic elements of culture are intrinsically associated with features of human biology by origin. When some part of the environment is integrated into culture in a universal manner, regardless of any local tradition, this rule always applies.

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A NEW SPECIES OF *HOMO* REPRESENTED BY A FOSSIL FROM THE BOTTOM PART OF THE PLEISTOCENE LAYER AT DMANISI, GEORGIA

The present publication is the last one authored by the founder of the Georgian mammal paleobiology and paleoanthropology, L.K. Gabunia, who has played a key role in the study of unique hominid fossils from Dmanisi.

Introduction

In September 2000, during the clearing of one of the previously excavated platforms (square 64/59, Fig. 1), G. Kiladze, a technical assistant from the State Museum of Georgia, discovered a nearly complete fossil hominid mandible in the blackish-gray sands immediately overlying the basalt crust of this area. The specimen (Fig. 2 – 5) was designated D2600. In the same outcrop, situated 30 m east of the place where the first hominid fossils were discovered (Gabunia, 1992; Gabunia, Vekua, 1993, 1995; Gabunia et al., 1999; Gabunia et al., 2000), and in the same layer that contained D2600, a well-preserved M_3 of *Archidiskodon meridionalis taribanensis* and fragments of bones of *Dama cf. nestii* and *Ursus etruscus* were found.

The new fossil, associated with the utmost bottom of the ossiferous horizon, is very different from the previously described D211 mandible (Gabunia, 1992; Gabunia, Vekua, 1993, 1995) in terms of both size and descriptive traits. The combination of primitive features (peculiar to australopithecines and early African *Homo*) and derived features has not been observed in any other early or middle Pleistocene hominids, making it difficult to assess even the generic status of D2600. One can immediately discard any nonhuman primate affinities, as well as those with hominoids formerly described as *Dryopithecus*, *Sivapithecus* (Simons, Pilbeam, 1965), *Graecopithecus* (Koenigsvald, 1972) or *Ankarapithecus* (Alpagut et al., 1996). Even the mandible of *Uranopithecus* (Bonis, Koufos, 1993), which is closer to D2600, sharply differs from it by the symphyseal morphology as well as by a much wider ascending ramus, elongated condyles, P_3 shape, etc. The new fossil is even more different from the mandible of *Gigantopithecus* with its sharply inclined ramus and weakly expressed molar necks (Simons, 1978). D2600 is much closer to mandibles of australopithecines, however, as will be demonstrated below, it is much more likely that it represents *Homo* rather than *Australopithecus*. We believe that the specimen belongs to a new species of *Homo*, for which we propose the name *Homo georgicus sp. nov.*

Description and comparative analysis

Very large dimensions (full length, 126.9 mm, breadth, 133.5 mm, ascending rami height, 91 mm), especially a very high symphysis (49.2 mm), set D2600 apart not just from Dmanisi D211 (Gabunia, 1992; Gabunia, Vekua, 1993, 1995), but from mandibles of *Homo ergaster* (ER992 (Groves, Mazak, 1975; Wood, 1991);

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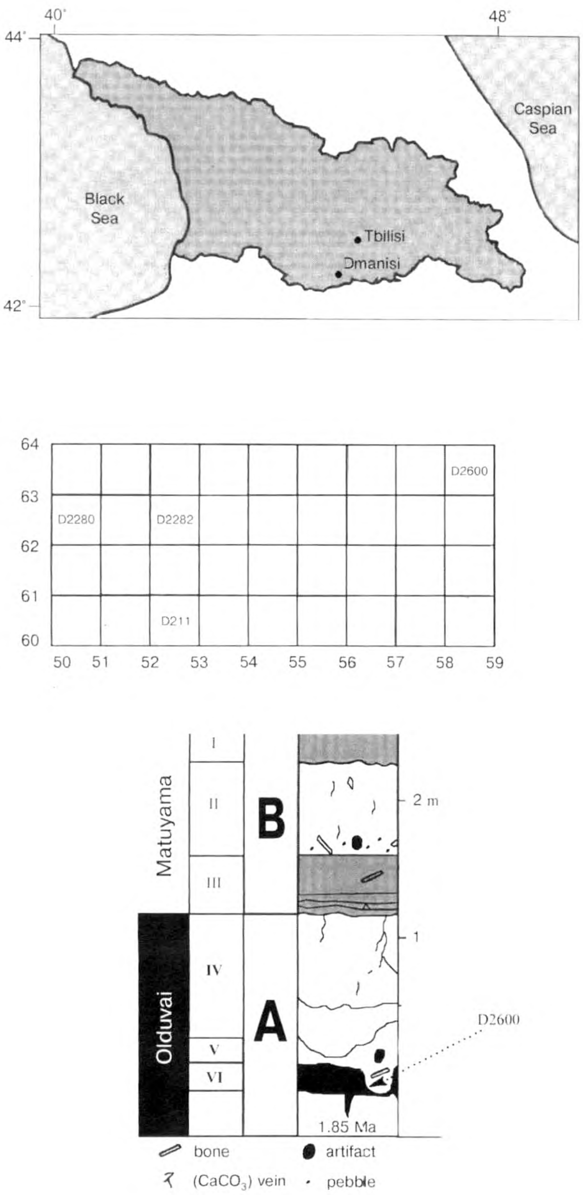

Fig. 1. Geographical position of Dmanisi (*a*); the position of D2600 in the excavation area (*b*) and in the section (*c*).

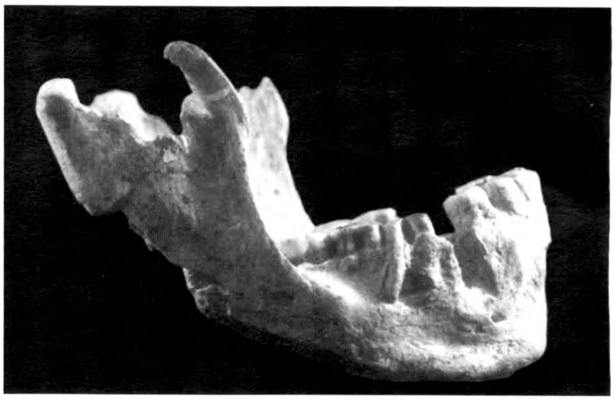

Fig. 2. D2600 mandible, lateral view, × 0.61.

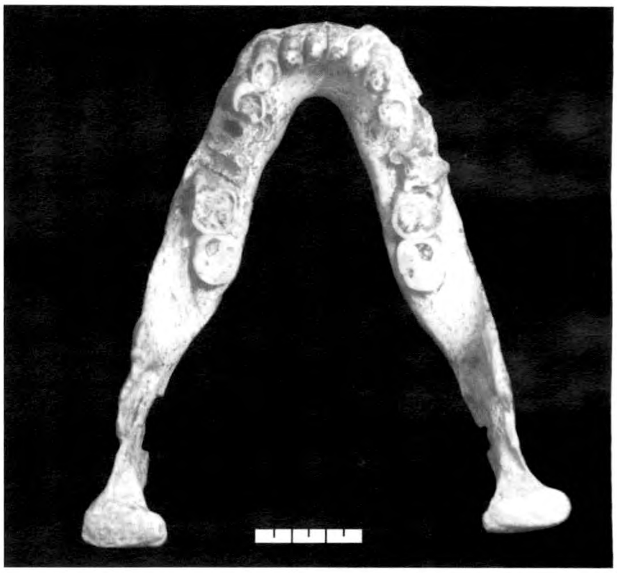

Fig. 3. D2600 mandible, superior view, × 0.53.

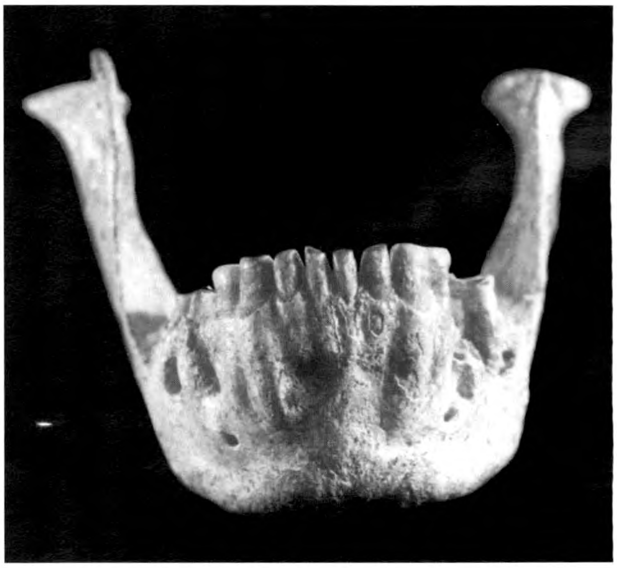

Fig. 4. D2600 mandible, anterior view, × 0.96.

ER730; WT15000 (Walker, Leakey, 1993)), as well as those of any Asian *Homo erectus* (Weidenreich, 1936, 1945; Sartono, 1991; Koenigswald, 1968; Wolpoff, 1975, 1999; Franzen, 1985a, b; Rightmire, 1990). In terms of total size, it is comparable to Tighenif 3 (Arambourg, Hoffstetter, 1963), while sharply differing from it by the shape of the alveolar arch and the posterior symphyseal morphology as well as by a number of other descriptive traits. By being very large, D2600 resembles the Sangiran 6 mandible, which is, however, quite dissimilar to it due to the shape of the body (very considerable thickness, absence of torus, etc.) (Koenigswald, 1968; Franzen, 1985a, b; Wolpoff, 1999). The alveolar arch in D2600 is quite long (174 mm), narrow, and V-shaped, with a very large masticatory part surpassing one half the total length of the specimen. The arch length is larger than it is in any early or middle Pleistocene *Homo* mandibles (Schrenk et al., 1993), and is exceeded only by the respective diameter in some australopithecines such as SK23 and AL266. However, the length to breadth ratio (95) is close to that in *H. rudolfensis*, *H. habilis* and *H. ergaster*, in which this index usually falls below 100. The robusticity of the Dmanisi specimen, estimated at the premolar level, is rather low due to a very high body (Table 1). It is evidently less than in D211, *H. ergaster* or most Asian *H. erectus* (Ibid.), approaching that of Sangiran 1b, certain early *Homo* from Africa (ER1802), and australopithecines (Table 1).

The symphyseal region of D2600 (see Fig. 2, 4, 5) is the highest part of the body, having a subvertical anterior surface (its angle with the basal plane is close to 97°) and a considerable posterior extension of the lingual side. On the anterior surface, there are large and sharply protruding canine pillars (see Fig. 4) separated from the distinct central ridge by shallow vertical fossae. This sagittal convexity broadens downward and is delimited by a pair of medial tubercles which are closely linked with marginal tubercles situated laterally and very anteriorly. Among the mandibles of early *Homo*, a rather similar anterior symphyseal morphology is seen in UR501 (Ibid.), ER1802 (*H. rudolfensis*) (Bromage et al., 1995), and ER730 (Leakey, 1971) (*H. ergaster*), as well as in Dmanisi D211. All these display a sagital convexity, although without any traces of basal tubercles. The latter two specimens, however, have distinct anterior marginal tubercles. Extremely massive and sharply protruding canine pillars of D2600 are exceptional among the fossil hominid materials. Nor does any early *Homo* show the peculiar arrangement of basal tubercles on the anterior symphyseal surface displayed by the Dmanisi specimen.

The posterior symphyseal surface is gently sloping, with a large alveolar platform and a lower transverse torus, which sharply protrudes backward and is the most posterior point of the symphysis, reaching up to the middle of P_4 (see Fig. 5).

The distinct relief on the exterior surface of the body includes a narrow and deep intermolar furrow and a lower marginal torus with well-developed anterior marginal tubercle. This relief is not expressed as strongly in *H. habilis*, *H. ergaster* or Asian *H. erectus*, but quite pronounced in australopithecines, *H. rudolfensis* (ER1802), and the Tighenif mandibles. The mental foramen is situated at the level of the posterior part of P_3, and its position is very low: the distance separating it from the alveolar margin of P_3 is 27 mm, or 60% of the body height at the same level. In nearly all early and middle Pleistocene hominids, the mental foramen is situated somewhat higher (Bräuer, Schultz, 1996).

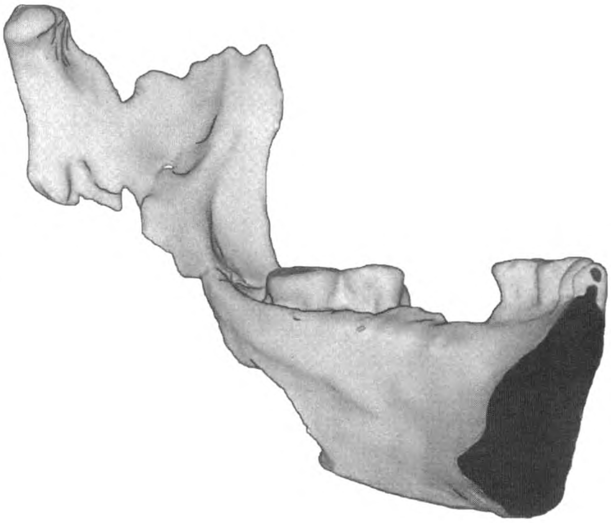

Fig. 5. D600 mandible, medial section (outline of tomogram).

On the interior surface of the body, there is a distinct mandibular torus, markedly convex in the paralactal part (from I_1 to P_4). The mylohyoid line is well expressed. It is sharply curved anteriorly and inferiorly and gradually tapers off as it approaches the sublingual fossa. This curvature distinguishes D2600 from mandibles of *H. rudolfensis*, *H. ergaster*, and most *H. erectus*, in which, judging by the casts in the Marseille collection, it runs more or less horizontally.

The ascending rami are high (see Fig. 2, 4) and slightly inclined medially. They are higher than in any of the few early or middle Pleistocene hominid mandibles in which they are preserved. The relief of their medial surface in D2600 is quite pronounced: the temporal and buccal crests are well developed. In contrast, the ridges of the condylar process are weak, and instead of a retromolar platform, there is a rather deep fossa, apparently the place of attachment of m. buccinator. A similar relief of the inner part of the ascending ramus is seen in *H. habilis* (OH13) and, somewhat less developed, in *H. ergaster* (ER992, WT1500). It is weak in *H. erectus* (Tighenif 3). The retromolar fossa occurs in certain early and middle Pleistocene hominids, but is invariably more shallow than in D2600. The temporal crest together with its lower extension running along the alveolar margin forms an S-shaped curve, which is regarded as a plesiomorphy (Zeitoun, 1995). The crest pattern and the intercrestal fossa on the medial side of the ramus

Table 1. Dimensions of D2600 and other fossil hominid mandibles

Trait	D2600	D211	OH13*	ER730*	ER992*	Sangiran*		H. erectus*	Peninj 1*	Sk23*	ER729*	ER1802*
						1b	C					
Symphyseal height	49.2	30.8	–	32.5	37	32	41	37	50	50	(50)	36
Maximal thickness	22.4	17	–	17.5	21	17	19	20	24	–	32.5	24.5
Height at the level of mental foramen	45	26.2	26	32.5	32	33	(39)	39	41.5	40	46	40
Thickness at the same level	23.3	17.8	16.5	19	21	16	21.5	21	26.5	23.5	28	20
Height at the level of M_1	42.2	(25.4)	26.5	31.5	32	36	36.5	36.5	39	29	44.5	38
Thickness at the same level	23	20.4	18	19	20	16.5	20	20	28	24.5	27.5	23
Height at the level of M_2	38	(25.3)	28.5	31.5	35	33	(32)	36.5	37	36	43	(38)
Thickness at the same level	22.8	20.4	22.5	19	24	17	23	22	31.5	26	29	27
Height at the level of M_3	(34)	(25.3)	26.5	30.5	37	31	33	–	33.5	(35)	43	–
Thickness at the same level	24	24.9	23	18.5	25	20	27	–	(32)	(27)	36	–

Note. Figures in parentheses have been estimated
* After (Wood, 1991).

in D2600 sets it apart from australopithicine mandibles, in which the crests on the interior surface of the coronal process are much less developed than those on the condylar process (Wood, 1991), and there is a small fossa near the posterior margin of the ramus, absent in the Dmanisi specimen.

The incisors of D2600, judging by the preserved roots, are rather small, especially the medial ones. The canines are large, with very large roots, which form ridges sharply protruding on the anterior surface of the symphysis. P_3 are medium (Table 2), with two completely separated roots (the mesial one has a split apical tip and is inclined mesially, whereas the distal one is oval in section, flattened in the mesio-distal direction, and carries a distinct vertical furrow). P_4 are lacking, but judging by the distance between P_3 and M_1 and the preserved alveole of the right P_4, they were relatively small (mesio-distal diameter, 8.4 mm) and double-rooted as well. Despite heavy attrition, P_3 preserves a weak disto-lingual swelling, and its sagittal axis is inclined inside. In both shape and size, this tooth resembles the likewise double-rooted P_3 of *H. rudolfensis* (ER1802, UR501) (Wood, 1991; Bromage et al., 1995). In *H. habilis*, the canines are less robust, and P_3 have a somewhat lesser mesio-distal diameter (Table 2). The same applies to *H. ergaster* (ER992, WT15000) (Rosas, Bermúdez de Castro, 1998), in which these teeth are similar to those of D211. Among the *H. erectus*, Sangiran 6 approaches D2600 in size and evidently in shape of P_3 (Tobias, Koenigswald, 1964), but, as previously noted, it is quite different in other traits. The molars in the new specimen are large and robust, progressively increasing from M_1 to M_3. Their size is close to that in *H. habilis* (OH13) (Groves, Mazak, 1975; Wood, 1993), but the Dmanisi molars are somewhat more robust (Table 2). In M_3, the protoconid, metaconid, and hypoconid are barely discernible; the former was evidently not connected with entoconid. The hypoconulid is rather large and apparently incorporated the sixth cusp. The attrition plane is flat, the vestibular margins being the most heavily worn. The roots are large, especially in M_3, and slightly inclined distally. Taurodontism is absent. The enamel thickness is considerable (up to 2 mm in certain places).

The comparative analysis of D2600 suggests that, despite certain primitive traits typical of some australopithecines (very high symphysis, subvertical profile of its anterior surface, marked posterior extension of the posterior margin of the lingual side, accordingly elongated retroincisive platform, paralactally narrowed outline of the inner surface, anterior position of the ascending rami, double-rooted premolars – a combination seen in specimens such as *A. boisei* from Lake Natron area), the Dmanisi individual differs from these hominids to such an extent that any affinities are ruled out. D2600 stands apart from both gracile (KNM-KP29281, MLD18, AL400-1, LH-4, STs36, STs52) and robust australopithecines (L7a-125, ER729, Pening 1, SK12A, SK23, TM1517) by a shorter alveolar arch, less extended backward and much less concave posterior symphyseal surface and, in most cases, by a less curved and less rugged anterior symphyseal surface, lesser robusticity of the body, narrower ascending rami with a different relief of their inner surfaces, relatively smaller posterior teeth, especially premolars, the anterior of which is differently shaped than are those of the australopithecines, as well as by larger incisors, and by other mandibular and dental traits.

Concerning the affinities of D2600 with *Homo*, we should first notice that it is quite different from the Dmanisi specimen D211 (Gabunia, 1992; Gabunia, Vekua, 1993, 1995). Their dissimilarity is so striking that it can hardly be attributed to sex dimorphism. Apart from very large size of the new mandible, the differences include the morphology of the body, which is considerably less robust due to a much larger height, the posterior surface of the symphysis, extending up to the level of P_4, much more expressed canine pillars, double-rooted premolars, proportions of the cheek teeth, specifically the molars progressively increasing in the posterior direction, a narrower paralactal part of the interior outline, etc.

Large size, especially length and height, distinguish D2600 from mandibles of *H. habilis* (Tobias, 1991), *H. ergaster* (Groves, Mazak, 1975), and nearly all Asian *H. erectus* (Weidenreich, 1936; Wolpoff, 1999). Also, it surpasses all these in the length of the alveolar-dental arch, the relative length of its masticatory portion, and, in nearly all cases, in breadth. A considerable posterior extension of the alveolar surface of the symphysis sets the Dmanisi mandible apart from those of *H. rudolfensis*, *H. ergaster*, and Asian *H. erectus*, while making it somewhat closer to *H. habilis* (OH7).

Due to the peculiar relief of the anterior symphyseal surface, characterized by a central ridge, a combination of basal tubercles with tightly connected anterior marginal ones, and sharply protruding parasagittal canine pillars, D2600 differs from mandibles of all the above hominids including those having a central convexity on the anterior symphyseal surface, and sometimes the thickening of its lower margin (as in D211, ER1802, ER730, Tighenif 3, etc.).

A distinct anterior thickening of the inner mandibular torus, causing a marked narrowing of the paralactal part of its outline, is not typical of *H. habilis*, *H. ergaster* or Asian *H. erectus*. In this respect D2600 resembles mandibles of some australopithecines such as *A. boisei* and *H. rudolfensis*.

A pronounced relief of the interior side of ascending rami in D2600 (strong temporal and buccal crests and a deep retromolar fossa) apparently distinguishes the new find from mandibles of *H. erectus* as well.

Finally, very robust canines and the morphology of P_3 with its obliquely oriented sagittal axis and two completely separated roots (the anterior one is large, sharply inclined mesially and has a split apical tip and a vertical furrow, whereas the posterior one is flattened in the mesio-distal direction and likewise carries a distinct vertical furrow) distinguish D2600 from *H. habilis*, *H. ergaster* and most *H. erectus*, and relatively large molars markedly increasing in size from M_1 to M_3 differentiate it from *H. ergaster* and nearly all *H. erectus*.

Taxonomy

While the position of D2600 with respect to previously described hominids from Dmanisi (D2280 and D2282 crania (Gabunia et al., 2000), D211 mandible (Gabunia, Vekua, 1993), and mtt III, D2021 (Gabunia et al., 2000)) is difficult to assess so far, its marked dissimilarity to either the above crania or the D211 mandible does not preclude the possibility of certain affinities between them.

Concerning the phylogenetic status of the new fossil, we see no reason for establishing its close ties with any fossil hominid species, probably including *H. ergaster*, whose mandible is the closest to D2600 Most likely, both species, *H. georgicus* and *H. ergaster*, originate from a common ancestral species of *Homo* belonging to the grade *H. habilis* (Tobias, Koenigswald, 1965; Zeitoun, 2000) or to a higher taxon described as *Habilinae* by certain writers (Wolpoff, 1999). Having separated from a common root, possibly from a form close to *H. rudolfensis*, the Dmanisi branch of *Homo* had undergone considerable evolutionary changes in the process of adaptation to a moderate climate of the non-tropical zone. As a result, a new species emerged.

A more detailed study of all the hominid remains from Dmanisi, their stratigraphy, and, possibly, new finds will hopefully shed light on the true phylogenetic relationships between these fossils.

Diagnosis of the new species

Family *Hominidae, Gray*, 1825
Genus *Homo, Linnaeus*, 1758
Homo georgicus sp. nov.

Holotype: A nearly complete mandible D2600 belonging to an elderly individual, possibly male, with four heavily worn incisors, two canines, two P_3, right M_1, right and

Table 2. Dimensions of teeth of D2600

Specimen	I_1				I_2				C				P_3			
	L	l	f	c	L	l	f	c	L	l	f	c	L	l	f	c
D2600 r	4 6	7	152	32 2	5 4	9	158	49.8	10 6	8 2	77 3	86 9	12	10	86 5	93 6
l	5	6 9	138	34 5	5 2	7 9	151	41	10	7 8	78	78	(11)	12 2	(92 7)	112 2
D211 r	5 9	5 8	98 3	34 2	6 6	6 4	97	42 2	8 7	8 2	94 2	71 3	9	9 8	108 9	82 2
l	6 2	5 9	95.1	33	6 4	6 3	98.4	40 3	8 6	7 9	87 9	67 9	8 9	9 6	107 8	85 4
OH13	–	–	–	–	–	–	–	–	7.6	7 9	103 9	60	9	8 7	96 6	78 3
OH7	6 5	6 7	103	43 5	7 3	7 6	104 1	55 4	8 9	–	–	–	9 5	9.7	102 1	92 1
Sangiran 9	–	–	–	–	–	–	–	–	7	8 8	125 7	61 6	9 9	11 5	116 1	113 8
ER992 r	–	–	–	–	–	–	–	–	8 9	4 5	106 7	84 5	9 5	10 5	110 5	99 7
l													9 7	10 3	106 1	99 9
H erectus	–	–	–	–	–	–	–	–	–	–	–	–	8 6	10 5	122	90 3
ER729	5	8	160	40	–	–	–	–	9 7	–	–	–	12 1	13 6	112 3	164 5
Peninj 1	5 6	6 3	112 5	35 2	6 2	6 4	103 2	39 6	7 3	8 2	112 3	64 2	9.5	11 3	118 9	107 3

Note L, length, l, breadth, f, index of shape; c, index of robusticity

left M_2 and M_3 (right and left P_4 and left M_1 were apparently lost ante mortem). Posterior portions of the basal part of the body and of the ascending rami are missing. The anterior surface of the symphysis and alveolar parts of the anterior cheek teeth are damaged. D2600 is in the possession of the S. Dzhanashia State Museum, the Georgian Academy of Sciences.

Site: Dmanisi is situated 85 km SE of Tbilisi, Republic of Georgia, at 44°21' E and 41°19' N.

Geological Age: The fossil is associated with the bottom part of the Pleistocene layer (Villanian to Biharian transition). According to paleomagnetic data, the ossiferous layers at Dmanisi date from the final Olduvai event and early Matuyama epoch (ca 1.77 Ma), and the isotopic age of the underlying basalts is 1.85 ± 0.01 Ma.

Diagnosis: An early Pleistocene member of the genus *Homo*, characterized by a very large mandible with a long and narrow alveolar arch, strongly developed masticatory portion, and a considerable posterior extension of the posterior symphyseal surface. The anterior symphyseal surface is subvertical, with pronounced canine pillars and a distinct central crest, which widens in the lower part and is laterally delimited by shallow fossae, and inferiorly by a pair of central tubercles, which are similar to lateral tubercles in later *Homo,* and are tightly connected with markedly displaced medially anterior marginal tubercles. Body height sharply decreases from a very high symphysis toward the posterior part, whereas body thickness slightly increases, attaining its maximum below M_3. The robusticity is moderate and evidently less than in *Homo ergaster* or most Asian *Homo erectus*. The outline of the interior part of the mandible is markedly narrowed in the paralactal portion (I_1 – P_4). The mylohyod line is sharply sloping anteriorly and inferiorly. The interior part of ascending rami is characterized by a considerable development of the temporal crest, which forms the anterior border of a rather large fossa corresponding to the retromolar platform and apparently increasing the surface of the m. temporalis attachment. The incisors, especially medial ones, are relatively small. The canines are large and their roots are quite robust. P_3, too, are large, each with a medially inclined sagittal axis and two separate roots, the mesial of which is roundish-oval in section, mesially inclined, with a split apical tip, and the distal one straight, mesio-distally flattened, with a distinct vertical groove. P_4, judging by the right alveole, was relatively small and likewise double-rooted. The molars are large, progressively increasing from M_1 to M_3. Dental attrition is atypical (non-helicoidal), the vestibular wear being the heaviest.

Diagnostic features of the mandible

1. Very large size: total length, 126.9 mm, breadth, 133.5 mm, height, 91 mm

2. Long (174 mm) and narrow V-shaped alveolo-dental arch (index, 111) (Schrenk et al., 1993; Leakey, 1971).

3. The paralactal part of the interior outline of the mandible (arcus lingualis) is markedly narrowed, resembling the respective part in australopithecines and certain early *Homo* such as *H. rudolfensis*.

4. The masticatory part is well-developed, constituting a little more than half of the total length of the mandible.

and some other fossil hominids

P_4				M_1				M_2				M_3			
L	l	F	c	L	l	f	c	L	l	f	c	L	l	f	c
(8 4) –	– –	– –	– –	(13) –	(11) –	– –	– –	14 13 5	13 13	98 5 96 2	179 5 175 5	15 2 11 6	12 6 13 3	82 8 85 2	191 5 191 9
8 1 8	9 2 9 6	113 5 120	74 5 76.8	13 2 13	12 3 12 5	93 1 96 1	162 3 162 5	12 3 11 5	11 5 11 6	93 100 8	141 4 133 4	11 2 10 7	10 6 10 6	94 6 99	118 7 113 4
8 9	10 1	118 8	89 8	12 7	11 6	91 3	147 3	13 8	12 2	88 4	168.3	14 6	12 5	85 6	182 5
10 3	9 8	110 1	100 9	14 3	12 2	85 3	174 4	15 6	13 5	86 5	201 6	–	–	–	–
8 9	–	–	–	–	–	–	–	12 9	11 6	89 9	149 6	12 5	11	88	137 5
8 2	10 7	103 8	87 7	11 5	9 8	85 2	112 7	13 9	12 7	91 3	176 5	13	12 9	99 2	165.7
9 4	11 7	117 7	109 9	12 8	12 7	99 2	162 5	13 7	13 3	97	182 8	14	12 2	87 1	170.8
15	14 6	97 3	219	16 4	16	97 5	269 4	(20 5)	(18)	87 8	(369)	22 9	19	85 5	435 1
14 6	15	102 7	219	16 6	15 4	92 7	255 6	17 8	16 2	91 0	288 3	18 8	15 7	83 5	295 1

5. The symphysis is very high (49.2 mm). In this regard, D2600, like some australopithecines (Peninj 1, ER729, etc.) and Asian *H. erectus* (Sangiran 6), occupies an extreme position among the hominid fossils.

6. The anterior part of the symphysis is subvertical and bears large and sharply protruding canine pillars, which are more robust than in any hominids including the australopithecines.

7. A weakly developed but distinct sagittal convexity of the anterior symphyseal surface widens inferiorly and is delimited by two basal tubercles similar to lateral tubercles in late *Homo*, and tightly connected with laterally adjoining anterior marginal tubercles. Isolated elements of trigonum mentale occur in other early hominids such as *H. rudolfensis* and *H. ergaster* (Koenigswald, 1968; Wolpoff, 1999) and even in australopithecines such as SK74, but the peculiar combination of these elements in D2600 and the presence of tubercles obviously analogous to lateral ones has not been registered in any of these so far.

8. The posterior symphyseal surface is gently sloping, with a large alveolar arch platform and posteriorly extending lower transverse torus reaching up to the middle of P_4. A likewise large posterior extension of the symphysis occurs in certain australopithecines (SK23, AL400, etc.) and evidently in *H. habilis* (OH7) as well.

9. The body height rather sharply decreases in the posterior direction, and its thickness increases just slightly, being maximal (24 mm) under M_3.

10. The robusticity of the body at the premolar level is relatively low (index, 53). This is lower than in D211, *H. ergaster* or most Asian *H. erectus*, and close to that in *H. rudolfensis* (ER1802) and Sangiran 1b, as well as in some australopithecines such as SK23.

11 The exterior surface of the body reveals a moderately developed lateral eminence, a rather deep intermolar groove, and a well expressed inferior marginal torus with a pronounced anterior marginal tubercle situated at the level of the posterior half of the canine.

12. The mental foramen is situated at the level of the posterior part of P_3 and its position is very low (its distance from the alveolar margin of P_3 makes up 60% of the body height).

13. On the interior surface of the body, there is a distinct mandibular torus forming a marked convexity in the paralactal portion (from I_1 to the middle of P_4).

14. The mylohyoid line slopes anteriorly and inferiorly and gradually disappears toward the sublingual fossa. In this trait, D2600 differs from D211 as well as from mandibles of *H. rudolfensis*, *H. ergaster* and most Asian *H. erectus*, in which this line runs more or less horizontally or is very slightly sloping anteriorly and inferiorly.

15. The relief of the medial surfaces of ascending rami is quite pronounced. Ridges of the coronal process are well expressed, and those of the condylar one, weak. Instead of the retromolar platform, there is a rather deep retromolar fossa, evidently marking the place of m. buccinator attachment.

16. The temporal crest and its inferior extension form an S-shaped curve viewed as a plesiomorphy by some writers (Zeitoun, 1995).

17. The incisors, especially medial ones, are rather small.

18. The canines are large, with robust roots. Together with the incisors they form a solid row forming the anterior margin of the mandible.

19. P_3 are comparatively large, with an interiorly inclined sagittal axis, marked disto-lingual swelling, and two quite separate roots, the mesial of which has a split apical tip and the distal one is flattened mesiodistally and carries a distinct vertical furrow.

20. Both P_4 are missing, but, judging by the right alveole, they were relatively small (their mesio-distal diameter apparently did not exceed 8.4 mm) and likewise double-rooted.

21. The molars are large, progressively increasing from M_1 to M_3, with a flat attrition plane and atypical (non-helicoid) wear The roots are large, especially in M_3, and slightly inclined distally (the mesial and distal roots of M_1 are rather close to each other); taurodontism is absent and the enamel is rather thick (up to 2 mm in some places).

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EXPLORING THE OLDEST POTTERY IN THE WORLD AND NEOLITHIZATION OF EURASIA
(review of international symposia, England and Slovenia, 2001)

Two international symposia devoted to the study of Eurasian Neolithic problems took place in October – November, 2001. This review introduces the main issues of these meetings to archaeologists and specialists in related fields.

The international symposium ***Exploring the Contexts for the Oldest Pottery in the World*** took place in Cambridge and Norwich (England) October 25 – 28, 2001 and was dedicated to recent discoveries of pottery dated more than 10,000 years in Japan, China, and Russia. The symposium was organized by the University of Cambridge, McDonald Institute for Archaeological Research (Cambridge), Kokugakuin University (Tokyo), University of East Anglia (Norwich), and Sainsbury Institute for the Study of Japanese Arts and Culture (Norwich). Twenty-five specialists from eight countries (Great Britain, Japan, China, Russia, Canada, Belgium, Poland, and the USA) took part in the sessions and presented oral reports.

Several presentations dealt with the earliest pottery recently discovered in Japan. In the paper by *Y. Taniguchi* (Kokugakuin University, Tokyo), "The origins of pottery in the Japanese Archipelago and its chronology," delivered by S. Kaner, the main focus was on the Incipient Jomon at the Odai Yamamoto 1 site in northern Honshu (Aomori Prefecture). This site belongs to the Chojakubo culture and was long considered to be Upper Paleolithic. In 1998, during a small-scale excavation campaign (excavated area totals 48 sq. m), 46 pottery fragments made without organic temper were found in layers 3 and 4. The sherds probably belonged to a flat-based undecorated vessel (wall thickness of 7.6 mm). They are stratigraphically associated with blades and scrapers as well as with arrowheads considered to be the earliest in Japan. Traces of carbonized material are visible adhering onto sherd surfaces, indicating that the vessel was used for cooking.

Several radiocarbon dates from layer 3 were obtained; charcoal dates range between 13,500 radiocarbon years ago (hereafter BP) and 7100 BP, and dates on adhering food vary between 13,200 BP and 12,700 BP. The food adhesion on pottery fragments from layer 4 was dated to 13,800 – 12,700 BP, and the tephra deposits overlying layer 4 were dated to 13,800 - 10,400 BP. The speaker considered the two earliest food adhesion dates, 13,780 ± 170 BP (NUTA-6510) and 13,210 ± 160 BP (NUTA-6515), to be the most reliable ones, and the Chojakubo culture can be dated to 13,800 – 13,200 BP. Thus, Odai Yamamoto 1 is now the earliest Jomon site in all of Japan. Using this information, it was concluded that pottery manufacture on the Japanese Islands had started before the substantial climatic changes of the Late Glacial, such as Bølling warming (ca 12,500 BP) and Younger Dryas cooling (ca 11,000 BP). Previously it was supposed that pottery emerged during the time of those rapid climatic fluctuations.

It should be noted that the results of the Odai Yamamoto 1 excavations were published as a separate volume (Archaeological research..., 1999) with an extended English summary (Taniguchi, 1999). In the excavation report, stratigraphy and artifacts from this unique site are presented in detail, allowing us to independently evaluate the reliability of the results.

In the paper by *K. Yano* (Tatsuuma Archaeological Museum, Kobe), "Pottery and stone tools from the Incipient Jomon in western Honshu Island," the Torihama

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site (Fukui Prefecture) was a key subject. At two other sites, Kiriyama Wada and Kitano Uchikatabiro (both in the Nara Prefecture), three Incipient Jomon pottery types belonging to the Ryukisenmon style were distinguished: (1) thin pottery (thickness of walls of 2 – 8 mm); (2) thick pottery (thickness of walls more than 8 mm); and (3) thin pottery with organic temper (grass). It was noted that Incipient Jomon assemblages in western Honshu do not contain round-based vessels. The oldest pottery at Matawari Cave (Hiroshima Prefecture) was radiocarbon-dated to about 12,100 BP.

In the paper by *T. Kobayashi* and *O. Nakamura* (Kokugakuin University), "Incipient Jomon sites from southern Kyushu," three terminal Pleistocene migration routes from the mainland to the Japanese Islands were proposed, based on analyses of the earliest Neolithic sites in Northeast Asia: (1) from modern Northeast China via the Korean Peninsula to Kyushu; (2) from modern Primorye (Maritime Region of Russia) by boats to Honshu; and (3) from the Lower Amur River basin via Sakhalin to Hokkaido.

Two reports dealt with Siberia and the Russian Far East In the paper by *P.-L. van Berg* (Free University of Brussels, Belgium) and *N Cauwe* (Royal Museum of Art and History, Brussels, Belgium), "Hunter-gatherer pottery in Siberia and its relationship to Mesolithic ceramic production in northern Europe," a review of Neolithic chronology and economy in Siberia, North and Central Europe was presented. European pottery was subdivided into two groups: (1) agriculturalist pottery and (2) hunter-gatherer pottery. The origin of the second group was associated with Asia due to the fact that the Neolithic cultures in Siberia, according to the radiocarbon chronology, are older than those in northern parts of West, Central, and East Europe.

In the paper by *Y.V. Kuzmin* (Pacific Institute of Geography, Vladivostok, Russia), "Chronology and environment of the earliest pottery complexes in the Amur River basin (Russian Far East)," geoarchaeological characteristics of the earliest Neolithic complexes were given. Nowadays, it is evident that both the Osipovka and the Gromatukha cultures existed during 13,000 – 10,000 BP in an environment of dark coniferous forests with some admixture of broadleaf species Thus, sites belonging to these cultures (Gasya, Khummi, Goncharka, and Gromatukha) represent the earliest Neolithic assemblages of the Russian Far East and Siberia and are associated with the initial Neolithic of East Asia.

In a number of papers, new data on the archaeology and chronology of the earliest Neolithic sites in China were reported. *Cao Bingwi* (China Cultural Relic News, Beijing) presented a review of the earliest pottery found in North and South China (archaeological regions divided by the Yangtze River) The earliest Neolithic sites are known from the southern part of China. From organic matter in pottery, found in layer 5 of the Miaoyan site (Guangxi Zhuang Autonomic Region), two radiocarbon dates were obtained: 15,220 ± 260 BP (BA94137b) and 15,120 ± 500 BP (BA94137a). The age of Xiarendong and Diaotonghuan sites (Jiangxi Province) with crude pottery and polished stone tools was estimated at 14,000 – 9000 BP. Fragments of thick-walled pottery (up to 2 cm) from Yuchanyan site (Hunan Province) were dated by the thermoluminescence method to ca 10,000 years, corresponding to a radiocarbon date of ca 9000 BP* In North China, the earliest Neolithic sites are Nanzhuangtou (near Beijing), with radiocarbon dates of about 10,500 – 10,200 BP, and Yujiagou (Hebei Province), with pottery dated by thermoluminescence to about 11,600 years (Zhao, Wu, 2000: 238). The thermoluminscence age corresponds to radiocarbon date of about 10,200 BP.

The main conclusions made by the speaker were: (1) the beginning of pottery manufacture in South China is now dated to about 15,000 BP; and (2) the emergence of pottery and the beginning of rice cultivation in South China are closely connected with each other.

In the paper by *T. L.-D. Lu* (Chinese University of Hong Kong, Hong Kong), "Early pottery found in South China," it was shown that the Miaoyan site contains the earliest pottery (see above). The speaker cast doubt on the reliability of radiocarbon dates from areas with wide distribution of limestone rocks, and both Xiarendong and Diaotonghuan sites are located in such an area. Also, the complicated stratigraphy of cave sites, especially the Xiarendong, was highlighted. In the opinion of the speaker, the dates obtained for this site are 1000 – 2000 years older than its actual age, and thus the most probable timeframe for the earliest Chinese pottery is about 12,000 – 10,000 BP. The important conclusion is that the occurrence of pottery, together with polished bone tools, shells, and wild rice remains, signals a significant transition in the subsistence system in South China, at a time when human adaptation to environment increased considerably.

In the paper by *Zhang Chi* (Peking University, Beijing), "The early pottery in China," radiocarbon dates from the Miaoyan (ca 15,700 BP) and Xiarendong (ca 17,600 – 12, 400 BP) sites were presented. It was pointed out that the earliest pottery from both the Xiarendong and Yuchanyan sites is round-based. Rice husks were discovered in the bottom layer of Yuchanyan and the rice remains were identified as both wild and cultivated species. The speaker concluded by proposing the existence of two cultural traditions in China at the end of Pleistocene, one in South China and another in North China. In the southern part of the country, pottery might be dated up to about 16,000 BP. The earliest pottery was decorated by horizontal stripes; cord-marked pattern appeared later. In North China, the earliest pottery was found in association with microlithic tools. This pottery displays similarities with that discovered in the Russian Far East and Japan.

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* The newest radiocarbon dates from this site are as follows: date from layer with pottery and rice grains – 13,680 ± 270 BP (BA96058); dates for pottery organics – 14390 ± 230 BP (BA95057b) and 11,970 ± 120 BP (BA 95057a) (Zhao, Wu, 2000: 236)

It should be noted that the above-mentioned presentations of Chinese scholars were not illustrated with excavation plans or profiles demonstrating the association between the earliest Neolithic cultural layers and the position of samples taken for radiocarbon dating For symposium participants, it was difficult to evaluate the reliability of the information presented, particularly if the radiocarbon dates of 17,600 – 15,100 BP were associated with Neolithic cultural component. It is also important to keep in mind that until now, there were no charcoal radiocarbon dates from layer 5 of the Miaoyan site (Zhao, Wu, 2000). The extremely complicated stratigraphy of cave sites in South China, Xiarendong in particular, forces us to treat the very old Neolithic dates, 17,600 – 12,400 BP, with great caution.

In the paper by *R. Bettinger* (University of California at Davis, USA), "Ceramics and adaptive change in North China at the end of the Pleistocene," the emergence of stable pottery production was associated with the human response to natural environmental changes.

Several well-known specialists in the field of East Asian archaeology, such as *F. Ikawa-Smith* (McGill University, Montreal, Canada), *B. Hayden* (Simon Fraser University, Burnaby, Canada), *S. Kaner* (Sainsbury Institute, Norwich, England), and *R. Pearson* (University of British Columbia, Vancouver, Canada), took part in the discussion of reports presented. It was decided to publish the symposium proceedings as a separate volume.

Symposium participants visited the biggest prehistoric flint mine in England, Grimes Graves in Norfolk County, and also observed a collection of Jomon pottery at Sainsbury Center for Visual Arts (University of East Anglia, Norwich). An exhibition of Jomon pottery was organized in conjunction with the symposium at the Fitzwilliam Museum, University of Cambridge.

The second symposium, ***The Neolithization of Eurasia – Perspectives from pottery***, took place in Ljubljana (Slovenia) from November 8 – 10, 2001, and was organized by the University of Ljubljana. Eighteen scholars from 10 countries (Slovenia, Great Britain, Greece, Austria, Japan, Russia, China, Sweden, Croatia, and Macedonia) took part in the sessions with oral presentations. In this overview, the most interesting papers in terms of methodology are covered.

Papers about the earliest pottery in East Asia, presented by *Y.V. Kuzmin* and *Zhang Chi*, were similar to those delivered at the previous meeting in England (see above). In the paper by *M. Nishida* (Tsukuba University, Japan), "Another Neolithic in the Holocene Japan," a detailed review of Jomon economy was given. The distinctive features of Jomon were a very early emergence of pottery (ca 13,000 BP) and permanent settlements (ca 10,000 BP), and a very late emergence of agriculture (ca 2500 BP).

Several papers were devoted to the study of organic remains in ceramics for the reconstruction of vessel functions. *R. Evershed* (University of Bristol, Great Britain) in the paper "Lipids in ancient ceramics as carriers of anthropogenic signals from prehistory," presented a review of gas chromatography used for the identification of lipids (animal fats, plant oils, and resins, all exclusively biogenic compounds) absorbed in pottery pores during vessel usage (for food cooking, leaching, storage, etc.). Lipids are usually preserved in pottery for a long time, at least for several millennia. Lipid compounds, extracted with alcohol and then separated using gas chromatograph, are being analyzed to determine their main categories, such as animal fats, plant oils, waxes, etc. This method provides a great opportunity for the identification of ancient pottery functions, making it possible to obtain reliable information about paleoeconomy type. In general, such research is a part of biomolecular studies in archaeology, a field that is rapidly developing in Great Britain.

O. Craig (Newcastle University, Great Britain) also deals with lipid analysis in his paper "The identification of milk residues in Neolithic pottery of Europe." He argues that with the help of biomolecular methods, it is possible to determine if milk and dairy products were used as food in the European Neolithic, and thus if Neolithic people practiced animal breeding.

In the paper by *C. Bonsall* (University of Edinburgh, Great Britain), "Direct dating of Neolithic pottery: Progress and prospects," methods of determining the age of pottery were reviewed. Four independent methods are presently used for this purpose: (1) stylistic analysis of ornamentation, shapes, etc.; (2) radiocarbon dating of organics preserved on sherd surface or inside the sherds; (3) luminescence dating of minerals within the sherd; and (4) archaeomagnetic dating It was underscored that for reliable age determination, it is necessary to use a combination of at least of two methods (now it is possible to date directly lipids and organic temper in pottery, as well as food adhesions, using the accelerator mass spectrometry technique – **Y.K.**).

In was decided to publish the symposium proceedings as a separate issue of *Documenta Praehistorica*, the journal of the Archaeology Department, University of Ljubljana, edited by *M. Budja*, chief organizer of the Neolithic seminars. The journal has become annual and international due to his energy and hospitality.

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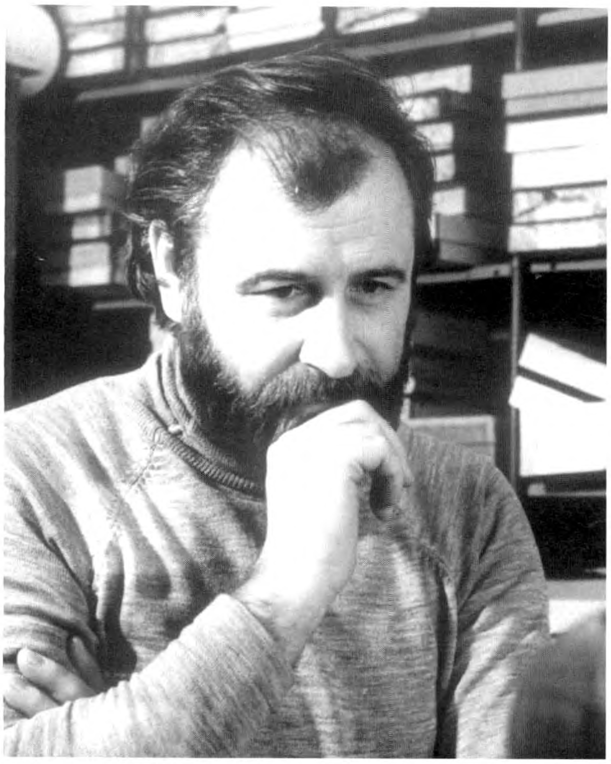
VITALY EGOROVICH MEDVEDEV



Vitaly Medvedev was born in the Borovlianka Village of Novosibirsk Province on November 1, 1941, into the family of Egor and Tatyana Medvedev, Russian migrants from European Russia. Since his youth, Medvedev has been allured by the romanticism of expedition life. He graduated from a trade school of forestry and worked for a forest aerial survey service. During that time, he acquired his first experience in field investigations. Medvedev's interest in archaeology, which was conceived during his school years, induced him to enter Tomsk State University in 1963. In 1964, during his second year, he entered the Humanities Department of Novosibirsk State University. His first archaeological investigations took place in the Ob River region and in Gorny Altai. Since 1966, Medvedev has been doing research in archaeology of the Far East. In 1969 Medvedev started his independent investigations in the Amur and Maritime (Primorye) regions. Under the tutorship of A.P. Derevianko, he conducted research for his final paper on the Early Iron Age. His Candidate Dissertation (1975) was dedicated to the archaeology of the Middle Ages under the supervision of A.P. Okladnikov, a founder of the Siberian archaeological school.

For a long period of time, Medvedev investigated cultural remains of the Juchen. As a result of his wide-scale field research carried out in a high professional standard, a variety of Juchen monuments, contemporaneous of Kievan Russia, were uncovered in the Amur River basin including cemeteries, separate burial mounds, settlements, forts, seasonal camps, temples, and hoards. Medvedev has published many scholarly works, including several monographs. He summarized the results of his research in his Doctoral Dissertation entitled *The Middle and Low Amur River Basin in the Final 1st – First Quarter of the 2nd Millennia AD (the Juchen Period)*, which he brilliantly defended in 1984.

The Neolithic of the Far East represents the other major field of Medvedev's interests. His studies in the Neolithic of the Amur basin allowed him to conclude that ceramics appeared in the Far East and in North Eurasia, as a whole, about five to six millennia earlier than it had been previously believed. The works of Medvedev and his colleagues at the settlements of Gasia, Gosian, and Sakachi-Alian allowed the distinguishing of an initial period of the Neolithic, beginning in the Late Pleistocene – Early Holocene. Medvedev correctly noted that the invention of ceramics brought the first man-made material into existence; and clay pottery representing a principle feature of the Neolithic is one of the major achievements during the history of mankind.

Among Medvedev's discoveries was the unique ancient heating system (*kang*) in a Neolithic dwelling located on the Suchu Island. He also discovered the most ancient Buddhist temple of the Bohai State at the Borisovksi site in the southern Primorye region. Medvedev's works provided new interpretations of stelae and rock art images of the Far Eastern Neolithic. On the basis of his research, he concluded that the original art of the Neolithic people in the Amur region was of a polysemantic nature.

Medvedev is recognized as a prominent researcher of the Far Eastern Neolithic. He has published about 200 scholarly works including 13 monographs and books for students. Five books were translated into foreign languages. Medvedev has maintained contacts with scholars in Russia, China, Korea, Japan, and other countries. His major works are dedicated to the Juchen culture of the Amur region in the AD 10th – 11th centuries (published in 1977 and 1986), chronology and archaeological materials from the Korsakovski burial ground (1991), the Gasia settlement (three volumes in co-authorship with A.P. Derevianko in 1993, 1994, and

1995), Medieval sites on the Ussuri Island (in Chinese, published in Harbin in 1990), Amur burial mounds (1998), the Bohai Temple in Primorye (in Russian and Korean in Seoul, 1998), etc. Medvedev has also worked as an editor of many scientific publications.

The UNESCO Nautical expedition "The Great Silk Way" (1991) is just one example of many international expeditions in which Medvedev has taken part. This one in particular took him to the countries of Thailand, Brunei, Philippines, China, Korea, and Japan. Moreover, he has also presented reports on his research at various international scientific congresses

Medvedev's scientific work is bound with the Institute of Archaeology and Ethnography, Siberian Branch of the Russian Academy of Sciences (the former Institute of History, Philology, and Philosophy) in Novosibirsk. There he began his career as a laboratory assistant and later became a researcher and led the group for studies of ancient cultures of the Amur region. Currently he has been appointed the head of the Neolithic Studies Department, and since the year 2000, he has co-directed the Joint Russian-Korean archaeological expedition investigating the Russian Far East.

Throughout his scientific career, Medvedev has maintained close contacts with the Humanities Department of Novosibirsk State University. He was the first to defend his candidate and later doctoral dissertations among those graduating from the Humanities Department majoring in archaeology. For several years, Medvedev delivered lectures on archaeology of the Middle Ages at home and at universities of China as well. Recently he has been devoting his time to the supervision of research works of post-graduate students.

His vast contributions to science have been officially acknowledged. Medvedev has received the Presidential Post-doctoral Scholarship. He was awarded the title of "Honorary Scientific Worker of the Russian Federation "

Dr. Vitaly Egorovich Medvedev turned 60 in November 2001. He is still full of ideas and creativity. During his nearly 40 years of scientific study, Medvedev has accumulated profound experience and knowledge that may lead to new achievements. His colleagues and the Editorial Board of the Journal wish him health and prosperity.

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LIST OF ABBREVIATIONS

AN MNR – Academy of Sciences of the Republic of Mongolia

AN SSSR – the USSR Academy of Sciences

ARGO – Archives of the Russian Geographical Society

BNC SO RAN – Buryat Research Center of the Siberian Branch, Russian Academy of Sciences

DVO AN SSSR – Far Eastern Branch of the USSR Academy of Sciences

IAE SO RAN – Institute of Archaeology and Ethnography, Siberian Branch of the Russian Academy of Sciences (Novosibirsk)

IA RAN – Institute of Archaeology, Russian Academy of Sciences (Moscow)

IIFF – Institute of History, Philology and Philosophy, Siberian Branch of the USSR Academy of Sciences (Novosibirsk)

RAN – Russian Academy of Sciences

REM – Russian Ethnological Museum

SB RAS – Siberian Branch of the Russian Academy of Sciences

UrO RAN – Uralian Branch of the Russian Academy of Sciences

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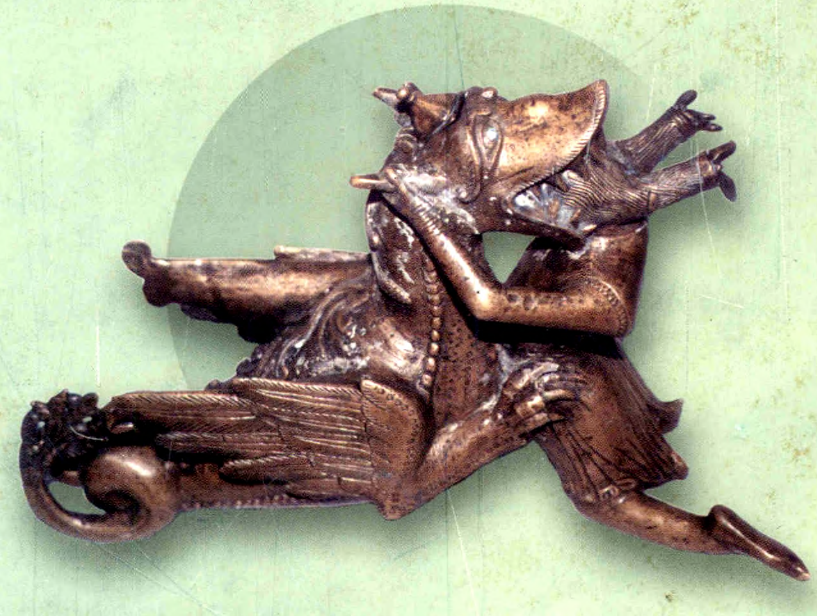

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